

CYPRESS SEMICONDUCTOR

PRODUCT CHANGE NOTIFICATION

PCN:020025

DATE: July 28, 2002

Subject: Moisture Sensitivity Level Change, 36/48 FBGA assembled at CML

To:

Description of change:

Cypress will start changing the packaging method on all FBGA 36/48 pin products assembled at Cypress Manufacturing Limited (CML) to non-dry pack, Moisture Sensitivity Level 1 per JESD22-A112.

Benefit of change:

Improved availability

Qualification status:

Completed. QTP 022802 is attached

Sample status:

Not applicable

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Cypress part numbers affected:

MKT_PART_NUM
CG5802ATT
CG5822AA
CG5822AAT
CG5855AA
CG5915AMT
CG5942ATT
CG6053ATT
CY37064VP48-100BAC
CY37064VP48-100BAI
CY37064VP48-143BAC
CY62136CV18LL-55BAI
CY62136CV18LL-70BAI
CY62136V18LL-70BAIT
CY62136VLL-55BAI
CY62136VLL-55BAIT
CY62136VLL-70BAI
CY62136VLL-70BAIT
CY62137BV18LL-70BAIT
CY62137CV18LL-55BAI
CY62137CV18LL-70BAI
CY62137CV18LL-70BAIT
CY62137VLL-70BAI
CY62137VLL-70BAIT
CY62138VLL-70BAI
CY62138VLL-70BAIT
CY62148CV25LL-55BAI
CY62148CV25LL-70BAI
CY62148CV33LL-70BAI
CY62148CV33LL-70BAIT
CY62157CV18LL-55BAI
CY62157CV18LL-70BAI
CY62157CV18LL-70BAIT
CY62157CV25LL-70BAI
CY62157CV30LL-55BAI
CY62157CV30LL-70BAI
CY62157CV30LL-70BAIT
CY62157CV33LL-55BAI
CY62157CV33LL-70BAI
CY62157CV33LL-70BAIT

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CY62158CV30LL-55BAI
CY62158CV30LL-70BAI
CY62158CV33LL-55BAI
CY62158CV33LL-70BAI
CY62158CV33LL-70BAIT
CY7C1021BV33-10BAC
CY7C1021BV33-12BAC
CY7C1021BV33-12BACT
CY7C1021BV33-12BAI
CY7C1021BV33-12BAIT
CY7C1021BV33-15BAC
CY7C1021BV33-15BAI
CY7C1021BV33-15BAIT
CY7C1021BV33L-15BAC
CY7C1021BV33L-15BAI
CY7C1021BV33L-15BAIT
CY7C1021CV33-12BAI
CY7C1021V33-10BAC
CY7C1021V33-12BAC
CY7C1021V33-12BACT
CY7C1021V33-12BAI
CY7C1021V33-15BAIT
CY7C1021V33L-15BACT
CY7C1021V33L-15BAI
CY7C1021V33L-15BAIT
WCMA2016U4X-FF55

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Subject: Moisture Sensitivity Level Change, 36/48 FBGA assembled at CML

Customer part numbers affected:

Approximate Implementation Date:
WW31 2002.

Response Required:
Response not required. This PCN is for information only.

Sincerely,

Mike Burke
Director of Quality

Al Laxman
PCN Process Manager

Cypress Semiconductor Package Qualification Report

022802 VERSION 1.0

July, 2002

48 Fine Pitch Ball Grid Array (FBGA)

7mm x 7 mm, MSL1

Cypress Philippines Assembly

CYPRESS TECHNICAL CONTACT FOR QUALIFICATION DATA:

Ed Russell
Reliability Director
(408) 432-7069

Al Laxman
Quality Engineering
(408) 545-7120

PACKAGE QUALIFICATION HISTORY

Qual Report	Description of Qualification Purpose	Date Comp
000204	Baseline MBGA (7mm x 7mm) with die size \leq 133.5 x 225.0 mils, MSL3, CSPI-R	Mar 00
000201	Auto-MBGA (7mm x 7mm) Assembly Qualification	Jun 00
022802	Upgrade from MSL3 to MSL1, CML-R	July 02

MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION

Package Designation:	BA48
Package Outline, Type, or Name:	Fine-Pitch Ball Grid Array (7mm x 7mm) FBGA
Mold Compound Name/Manufacturer:	Plaskon SMT B I N
Mold Compound Flammability Rating:	V-O per UL94
Substrate Material:	BT Resin
Lead Finish, Composition / Thickness:	Solder Ball 62%Sn - 36% Pb – 2%Ag
Die Backside Preparation Method/Metallization:	N/A
Die Separation Method:	Wafer Saw
Die Attach Supplier:	QMI
Die Attach Material:	QMI 506
Bond Diagram Designation	10-03495
Wire Bond Method:	Thermosonic
Wire Material/Size:	Gold, 1.0mil
Thermal Resistance Theta JA °C/W:	54.9°C/W
Package Cross Section Yes/No:	N/A
Assembly Process Flow:	11-20034
Name/Location of Assembly (prime) facility:	Cypress Philippines (CML-R)

ELECTRICAL TEST / FINISH DESCRIPTION

Test Location:	Cypress Philippines (CML-R)
Fault Coverage:	100%

RELIABILITY TESTS PERFORMED PER SPECIFICATION REQUIREMENTS

Stress/Test	Test Condition (Temp/Bias)	Result P/F
High Temperature Operating Life-Latent Failure Rate	1) QTP #000204 Dynamic Operating Condition, Vcc = 3.8V, 150°C	P
High Temperature Operating Life Early Failure Rate	1) QTP #000204 Dynamic Operating Condition, Vcc = 3.8V, 150°C	P
Temperature Cycle	1) QTP #022802 Precondition: JESD22 Moisture Sensitivity MSL1 168 Hrs., 85°C/85%RH+3IR-Reflow, 220°C+5, -0°C 2) QTP #000201, QTP #000204 Precondition: JESD22 Moisture Sensitivity MSL3 192 Hrs., 30°C/60%RH+3IR-Reflow, 220°C+5, -0°C JEDEC22, Condition C, -65°C to 150°C	P
High Accelerated Saturation	1) QTP #022802 Precondition: JESD22 Moisture Sensitivity MSL1 168 Hrs., 85°C/85%RH+3IR-Reflow, 220°C+5, -0°C 2) QTP #000201, QTP #000204 Precondition: JESD22 Moisture Sensitivity MSL3 192 Hrs., 30°C/60%RH+3IR-Reflow, 220°C+5, -0°C JEDEC22, Condition C, -65°C to 150°C	P
Pressure Cooker	1) QTP #022802 Precondition: JESD22 Moisture Sensitivity MSL1 168 Hrs., 85°C/85%RH+3IR-Reflow, 220°C+5, -0°C 2) QTP #000201, QTP #000204 Precondition: JESD22 Moisture Sensitivity MSL3 192 Hrs., 30°C/60%RH+3IR-Reflow, 220°C+5, -0°C JEDEC22, Condition C, -65°C to 150°C	P
High Temperature Storage	1) QTP #000201, QTP #000204 165C, no bias	P
Internal Visual	Cypress Spec 25-00017	P
External Visual	1) QTP #000204 Cypress Spec 25-00038	P
Physical Dimension	1) QTP #000204 Cypress Spec. 25-00031	P

RELIABILITY TESTS PERFORMED PER SPECIFICATION REQUIREMENTS (continuation)

Stress/Test	Test Condition (Temp/Bias)	Result P/F
Die Shear	1) QTP #000204 Cypress Spec 12-00292	P
Ball Shear	1) QTP #000204 Cypress Spec 12-00292	P
Bond Pull	1) QTP #000204 Cypress Spec 12-00292	P
Thermal Shock	1) QTP #000201, QTP #000204 125C, -55C	P
Acoustic Microscopy Test, (C-SAM)	1) QTP #022802, MSL1 2) QTP #000201, QTP #000204, MSL3 Cypress Spec 25-000104	P

RELIABILITY FAILURE RATE SUMMARY

Stress/Test	Device Tested/ Device Hours	# Fails	Activation Energy	Acceleration Factor ³	Failure Rate ⁵⁴
High Temperature Operating Life Early Failure Rate	1,548	0	N/A	N/A	0 PPM
High Temperature Operating Life ^{1,2} Long Term Failure Rate	178,580 HRs	0	0.7	170	30 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 = 8.62×10^{-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.

⁴ EFR and LFR Failure Rate based on QTP #000204

Reliability Test Data

QTP #: 022802

<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: ACOUSTIC - MICROSCOPE MSL1							
CY62127VLL-BA (7C621273A)	4943666	619938873	CML-R	COMP	15	0	
CY62127VLL-BA (7C621273A)	4941237	619938675	CML-R	COMP	15	0	
CY62127VLL-BA (7C621273A)	4938950	619938755	CML-R	COMP	15	0	
STRESS: HI-ACCEL SATURATION TEST, 130C, 85%RH, 3.63V, PRE COND 168 HR 85C/85%RH, MSL1							
CY62127VLL-BA (7C621273A)	4938950	619938755	CML-R	128	50	0	
STRESS: PRESSURE COOKER TEST (121C, 100%RH), PRE COND 168 HRS 85C/85% RH, MSL1							
CY62127VLL-BA (7C621273A)	4938950	619938755	CML-R	168	50	0	
STRESS: TC CONDITION C, -65C TO 150C, PRE COND. 168 HRS 85C/85% RH, MSL1							
CY62127VLL-BA (7C621273A)	4943666	619938873	CML-R	300	50	0	
CY62127VLL-BA (7C621273A)	4941237	619938675	CML-R	300	41	0	
CY62127VLL-BA (7C621273A)	4938950	619938755	CML-R	300	50	0	

Reliability Test Data

QTP #: 000201

Device Fab Lot # Assy Lot # Assy Loc Duration Samp Rej Failure Mechanism

STRESS: ACOUSTIC - MSL3

CY62137VLL-BAIB	4947142	610005251	CSPI-R	COMP	20	0	
CY62137VLL-BAIB	4947142	610005252	CSPI-R	COMP	20	0	
CY62137VLL-BAIB	4947142	610005253	CSPI-R	COMP	20	0	
CY62127VLL-BAI	4952762	610005248	CSPI-R	COMP	20	0	
CY62127VLL-BAI	4952762	610005249	CSPI-R	COMP	20	0	
CY62127VLL-BAI	4952762	610005250	CSPI-R	COMP	20	0	

STRESS: HI-ACCEL SATURATION TEST, 130C, 85%RH, 3.63V, PRE COND 192 HR 30C/60%RH. MSL3

CY62137VLL-BAIB	4947142	610005251	CSPI-R	128	59	0	
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STRESS: HIGH TEMP STORGAE, PLASTIC, 150C

CY62137VLL-BAIB	4947142	610005252	CSPI-R	500	50	0	
CY62127VLL-BAI	4952762	610005249	CSPI-R	500	50	0	

STRESS: PRESSURE COOKER TEST, 121C, 100%RH, PRE COND 192HRS 30C/60%RH,MSL3

CY62127VLL-BAI	4952762	610005248	CSPI-R	168	50	0	
CY62127VLL-BAI	4952762	610005249	CSPI-R	168	50	0	
CY62127VLL-BAI	4952762	610005250	CSPI-R	168	46	0	
CY62137VLL-BAIB	4947142	610005251	CSPI-R	168	50	0	
CY62137VLL-BAIB	4947142	610005252	CSPI-R	168	50	0	
CY62137VLL-BAIB	4947142	610005253	CSPI-R	168	50	0	

Reliability Test Data

QTP #: 000201

<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: TC CONDITION C, -65C TO 150C, PRE COND. 192 HRS 30C/60% RH, MSL3							
CY62137VLL-BAIB	4947142	610005251	CSPI-R	300	50	0	
CY62137VLL-BAIB	4947142	610005251	CSPI-R	500	50	0	
CY62137VLL-BAIB	4947142	610005251	CSPI-R	1000	50	0	
CY62137VLL-BAIB	4947142	610005252	CSPI-R	300	49	0	
CY62137VLL-BAIB	4947142	610005252	CSPI-R	500	49	0	
CY62137VLL-BAIB	4947142	610005252	CSPI-R	1000	49	0	
CY62137VLL-BAIB	4947142	610005253	CSPI-R	300	50	0	
CY62137VLL-BAIB	4947142	610005253	CSPI-R	500	50	0	
CY62137VLL-BAIB	4947142	610005253	CSPI-R	1000	50	0	
CY62127VLL-BAI	4952762	610005248	CSPI-R	300	50	0	
CY62127VLL-BAI	4952762	610005248	CSPI-R	500	50	0	
CY62127VLL-BAI	4952762	610005248	CSPI-R	1000	50	0	
CY62127VLL-BAI	4952762	610005249	CSPI-R	300	50	0	
CY62127VLL-BAI	4952762	610005249	CSPI-R	500	50	0	
CY62127VLL-BAI	4952762	610005249	CSPI-R	1000	50	0	
CY62127VLL-BAI	4952762	610005250	CSPI-R	300	50	0	
CY62127VLL-BAI	4952762	610005250	CSPI-R	500	50	0	
CY62127VLL-BAI	4952762	610005250	CSPI-R	1000	50	0	
STRESS: THERMAL SHOCK, CONDITION B 125C, -55C							
CY62137VLL-BAIB	4947142	610005252	CSPI-R	100	50	0	
CY62137VLL-BAIB	4947142	610005252	CSPI-R	200	49	0	
CY62127VLL-BAI	4952762	610005249	CSPI-R	100	50	0	
CY62127VLL-BAI	4952762	610005249	CSPI-R	200	50	0	

RELIABILITY TEST DATA

QTP#: 000204

DEVICE	ASSY-LOC	FABLOT#	ASSYLOT#	DURATION	S/S	REJ	FAIL MODE
=====							
STRESS: ACOUSTIC MSL 3							
CY62127V-BAI	CSPI-R	4943666	619938873	COMP	15	0	
CY62127V-BAI	CSPI-R	4941237	619938675	COMP	15	0	
CY62137V-BAI	CSPI-R	4942470	610002413	COMP	15	0	
CY62137V-BAI	CSPI-R	4938936	619938874	COMP	15	0	
CY62137V-BAI	CSPI-R	4938950	619938755	COMP	15	0	
CY62137V-BAI	CSPI-R	4940227	619938875	COMP	15	0	

STRESS: BOND PULL							
CY62127V-BAI	CSPI-R	4943666	619938873	COMP	15	0	
CY62127V-BAI	CSPI-R	4941237	619938675	COMP	15	0	
CY62137V-BAI	CSPI-R	4942470	610002413	COMP	15	0	
CY62137V-BAI	CSPI-R	4938950	619938755	COMP	15	0	
CY62137V-BAI	CSPI-R	4938936	619938874	COMP	15	0	
CY62137V-BAI	CSPI-R	4940227	619938875	COMP	15	0	

STRESS: PHYSICAL DIMENSIONS							
CY62127V-BAI	CSPI-R	4941237	619938675	COMP	5	0	
CY62127V-BAI	CSPI-R	4943666	619938873	COMP	5	0	
CY62137V-BAI	CSPI-R	4938950	619938755	COMP	5	0	
CY62137V-BAI	CSPI-R	4938936	619938874	COMP	5	0	
CY62137V-BAI	CSPI-R	4940227	619938875	COMP	5	0	

STRESS: DIE SHEAR							
CY62127V-BAI	CSPI-R	4941237	619938675	COMP	10	0	
CY62127V-BAI	CSPI-R	4943666	619938873	COMP	10	0	
CY62137V-BAI	CSPI-R	4942470	610002413	COMP	10	0	
CY62137V-BAI	CSPI-R	4938950	619938755	COMP	10	0	
CY62137V-BAI	CSPI-R	4938936	619938874	COMP	10	0	
CY62137V-BAI	CSPI-R	4940227	619938875	COMP	10	0	

STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE, 150C, 3.8V							
CY62137V-BAI	CSPI-R	4940227	619938875	48	280	0	
CY62137V-BAI	CSPI-R	4938950	619938755	48	338	0	
CY62137V-BAI	CSPI-R	4938936	619938874	48	386	0	
CY62137V-BAI	CSPI-R	4942470	610002413	48	544	0	

STRESS: EXTERNAL VISUAL							
CY62127V-BAI	CSPI-R	4943666	619938873	COMP	15	0	
CY62137V-BAI	CSPI-R	4938950	619938755	COMP	15	0	

STRESS: HI-ACCEL SATURATION TEST, 130C/85%RH/3.63V, PRECOND. 192 HRS 30C/60%RH, MSL3							
CY62137V-BAI	CSPI-R	4938950	619938755	128	48	0	
CY62137V-BAI	CSPI-R	4940227	619938875	128	47	0	

RELIABILITY TEST DATA

QTP#: 000204

DEVICE	ASSY-LOC	FABLOT#	ASSYLOT#	DURATION	S/S	REJ	FAIL MODE
=====							
STRESS: HIGH TEMPERARURE STORAGE							
CY62127V-BAI	CSPI-R	4943666	619938873	500	50	0	
CY62127V-BAI	CSPI-R	4943666	619938873	1000	50	0	
CY62137V-BAI	CSPI-R	4938950	619938755	500	50	0	
CY62137V-BAI	CSPI-R	4938950	619938755	1000	50	0	

STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (150C, 3.8V)							
CY62137V-BAI	CSPI-R	4938950	619938755	80	120	0	
CY62137V-BAI	CSPI-R	4938950	619938755	500	120	0	
CY62137V-BAI	CSPI-R	4938936	619938874	80	118	0	
CY62137V-BAI	CSPI-R	4938936	619938874	500	118	0	
CY62137V-BAI	CSPI-R	4940227	619938875	80	120	0	
CY62137V-BAI	CSPI-R	4940227	619938875	500	119	0	

STRESS: PRESSURE COOKER 100%RH, 121C							
CY62127V-BAI	CSPI-R	4941237	619938675	168	42	0	
CY62137V-BAI	CSPI-R	4938950	619938755	168	50	0	
CY62127V-BAI	CSPI-R	4943666	619938873	168	42	0	
CY62137V-BAI	CSPI-R	4940227	619938875	168	50	0	

STRESS: BALL SHEAR							
CY62127V-BAI	CSPI-R	4941237	619938675	COMP	15	0	
CY62127V-BAI	CSPI-R	4943666	619938873	COMP	15	0	
CY62137V-BAI	CSPI-R	4942470	610002413	COMP	15	0	
CY62137V-BAI	CSPI-R	4938950	619938755	COMP	15	0	
CY62137V-BAI	CSPI-R	4938936	619938874	COMP	15	0	
CY62137V-BAI	CSPI-R	4940227	619938875	COMP	15	0	

STRESS: TC COND. C, -65 TO 150C, PRECOND. 192 HRS 30C/60%RH, MSL 3							
CY62127V-BAI	CSPI-R	4941237	619938675	300	45	0	
CY62137V-BAI	CSPI-R	4938950	619938755	300	47	0	
CY62127V-BAI	CSPI-R	4943666	619938873	300	46	0	
CY62137V-BAI	CSPI-R	4938936	619938874	300	50	0	
CY62137V-BAI	CSPI-R	4940227	619938875	300	47	0	

STRESS: THERMAL SHOCK, CONDITION B, -55C							
CY62127V-BAI	CSPI-R	4943666	619938873	100	50	0	
CY62127V-BAI	CSPI-R	4943666	619938873	200	50	0	
CY62137V-BAI	CSPI-R	4938950	619938755	100	50	0	
CY62137V-BAI	CSPI-R	4938950	619938755	200	50	0	

STRESS: X-RAY INSPECTION							
CY62127V-BAI	CSPI-R	4943666	619938873	COMP	15	0	
CY62127V-BAI	CSPI-R	4941237	619938675	COMP	15	0	
CY62137V-BAI	CSPI-R	4938950	619938755	COMP	15	0	
CY62137V-BAI	CSPI-R	4938936	619938874	COMP	15	0	
CY62137V-BAI	CSPI-R	4940227	619938875	COMP	15	0	
