Cypress Semiconductor
2-Die Stacked & Molding Compound
Package Qualification Report

QTP# 023607 VERSION 1.0
March, 2003

CYM52KQT36AV25 18Mb Pipelined MCM with QDR Architecture in 165-ball FBGA package (2-die) using Toshiba KE-G1270 Molding Compound, MSL 3

ASE Taiwan (TAIWN-G)

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PACKAGE QUALIFICATION HISTORY

Qual Report		Description of Qualification Purpose		Date Comp
023607		18Mb Pipelined MCM with QDR Architecture, CYM52KQT36AV25 in 165-ball FBGA package (2-die stacked) using M/C Toshiba KE-G1270, Ablestik 2025D, QMI 1536 MSL3 at ASE Taiwan		Feb 03

MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION	
Package Designation:	BB165
Package Outline, Type, or Name:	165-ball Thin Ball Grid Array (FBGA)
Mold Compound Name/Manufacturer:	Toshiba KE-G1270
Mold Compound Flammability Rating:	V-O per UL94
Oxygen Rating Index:	＞28％
Substrate Material:	BT Resin
Lead Finish, Composition / Thickness:	Solder Ball, 63％Sn, 37％Pb
Die Backside Preparation Method/Metallization:	N/A
Die Separation Method:	Wafer Saw
Die Attach Supplier:	Dexter / Ablestik
Die Attach Material:	QMI 1536 / 2025D
Die Attach Method:	Epoxy
Bond Diagram Designation:	10-04731
Wire Bond Method:	Thermosonic
Wire Material/Size:	Au, 1.0um
Thermal Resistance Theta JA °C/W:	20.5°C/W
Package Cross Section Yes/No:	N/A
Assembly Process Flow:	49-41999
Name/Location of Assembly (prime) facility:	ASE Taiwan (TAIWN-G)

ELECTRICAL TEST / FINISH DESCRIPTION	
Test Location:	ASE Taiwan (TAIWN-G)
Fault Coverage:	100％

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, Vcc = 2.875V, 150°C	P
High Temperature Operating Life Latent Failure Rate	Dynamic Operating Condition, Vcc = 2.875V, 150°C	P
Temperature Cycle	JEDEC22, Condition C, -65°C to 150°C Precondition: JESD22 Moisture Sensitivity MSL3 192 Hrs., 30°C/60%RH+3IR-Reflow, 220°C+5, -0°C	P
High Accelerated Saturation	30°C, 2.75V, 85%RH Precondition: JESD22 Moisture Sensitivity MSL3 192 Hrs., 30°C/60%RH+3IR-Reflow, 220°C+5, -0°C	P
Pressure Cooker	121C, 100%RH Precondition: JESD22 Moisture Sensitivity MSL3 192 Hrs., 30°C/60%RH+3IR-Reflow, 220°C+5, -0°C	P
High Temperature Storage	150C, no bias	P
Internal Visual	Cypress Spec 25-00017	P
Die Shear	Cypress Spec 12-00292	P
Ball Shear	Cypress Spec 24-00018	P
Bond Pull	Cypress Spec 24-00002	P
Thermal Shock	125C, -55C Cypress Spec 25-00014	P
X-Ray	Cypress Spec 12-00292	P
Acoustic Microscopy Test, MSL3	Cypress Spec 25-000104 MSL 3	P

RELIABILITY FAILURE RATE SUMMARY

Stress/Test	Device Tested/ Device Hours	# Fails	Activation Energy	Thermal AF[3]	Failure Rate
High Temperature Operating Life Early Failure Rate	1,515	0	N/A	N/A	0 PPM
High Temperature Operating Life[1,2] Long Term Failure Rate	119,160 DHRs	0	0.7	170	45 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.

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Reliability Test Data

QTP #: 023607

Device	Fab Lot #	Assy Lot #	Ass Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ACOUSTIC MICROSCOPE, MSL3							
CYM52KQT36AV25-BBC (M52KQT36A)	4204559	*340200096*	TAIWN-G	COMP	15	0	
CYM52KQT36AV25-BBC (M52KQT36A)	4205697	*340200143/L1/L2*	TAIWN-G	COMP	15	0	
CYM52KQT36AV25-BBC (M52KQT36A)	4205697	*340200145*	TAIWN-G	COMP	15	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE, 150C, 2.875V, Vcc Max							
CYM52KQT36AV25-BBC (M52KQT36A)	4204559	*340200096*	TAIWN-G	48	760	0	
CYM52KQT36AV25-BBC (M52KQT36A)	4205697	*340200143/L1/L2*	TAIWN-G	48	755	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE, 150C,2.875V, >Vcc Max)							
CYM52KQT36AV25-BBC (M52KQT36A)	4204559	*340200096*	TAIWN-G	80	120	0	
CYM52KQT36AV25-BBC (M52KQT36A)	4204559	*340200096*	TAIWN-G	500	118	0	
CYM52KQT36AV25-BBC (M52KQT36A)	4205697	*340200143/L1/L2*	TAIWN-G	80	120	0	
CYM52KQT36AV25-BBC (M52KQT36A)	4205697	*340200143/L1/L2*	TAIWN-G	500	120	0	
STRESS: HIGH TEMP STORGAGE, PLASTIC, 150C							
CYM52KQT36AV25-BBC (M52KQT36A)	4204559	*340200096*	TAIWN-G	500	48	0	
STRESS: THERMAL SHOCK, CONDITION B 125C, -55C							
CYM52KQT36AV25-BBC (M52KQT36A)	4204559	*340200096*	TAIWN-G	100	49	0	
CYM52KQT36AV25-BBC (M52KQT36A)	4204559	*340200096*	TAIWN-G	200	49	0	
STRESS: EXTERNAL VISUAL							
CYM52KQT36AV25-BBC (M52KQT36A)	4204559	*340200096*	TAIWN-G	COMP	15	0	
STRESS: INTERNAL VISUAL							
CYM52KQT36AV25-BBC (M52KQT36A)	4205697	*340200143*	TAIWN-G	COMP	5	0	
STRESS: PHYSICAL DIMENSIONS							
CYM52KQT36AV25-BBC (M52KQT36A)	4205697	*340200143*	TAIWN-G	COMP	5	0	
STRESS: X-RAY							
CYM52KQT36AV25-BBC (M52KQT36A)	4205697	*340200143*	TAIWN-G	COMP	15	0	
STRESS: DIE SHEAR							
CYM52KQT36AV25-BBC (M52KQT36A)	4205697	*340200143*	TAIWN-G	COMP	15	0	
STRESS: BOND PULL							
CYM52KQT36AV25-BBC (M52KQT36A)	4205697	*340200143*	TAIWN-G	COMP	10	0	
STRESS: BALL SHEAR							
CYM52KQT36AV25-BBC (M52KQT36A)	4205697	*340200143*	TAIWN-G	COMP	100	0	
STRESS: HI-ACCEL SATURATION TEST, 130C, 85%RH, 2.75V, PRE COND 192 Hrs., 30C/60%RH, MSL3							
CYM52KQT36AV25-BBC (M52KQT36A)	4204559	*340200096*	TAIWN-G	128	46	0	

Reliability Test Data

QTP #: 023607

Device	Fab Lot #	Assy Lot #	Ass Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: PRESSURE COOKER TEST, 121C, 100%RH, PRE COND 192 Hrs., 30C/60%RH, MSL3							
CYM52KQT36AV25-BBC (M52KQT36A)	4204559	*340200096*	TAIWN-G	168	47	0	
STRESS: TC CONDITION C, -65C TO 150C, PRE COND. 192 Hrs., 30C/60%RH, MSL3							
CYM52KQT36AV25-BBC (M52KQT36A)	4204559	*340200096*	TAIWN-G	300	48	0	
CYM52KQT36AV25-BBC (M52KQT36A)	4204559	*340200096*	TAIWN-G	500	48	0	
CYM52KQT36AV25-BBC (M52KQT36A)	4205697	*340200143/L1/L2*	TAIWN-G	300	50	0	
CYM52KQT36AV25-BBC (M52KQT36A)	4205697	*340200143/L1/L2*	TAIWN-G	500	50	0	
CYM52KQT36AV25-BBC (M52KQT36A)	4205697	*340200145*	TAIWN-G	300	50	0	
CYM52KQT36AV25-BBC (M52KQT36A)	4205697	*340200145*	TAIWN-G	500	50	0	