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Cypress Semiconductor Product Qualification Report

QTP# 091602 VERSION*B
June, 2014

64 Meg MoBL SRAM Family Technology R95LD-3R, Fab4	
CY62187E* MoBL®	64 Mbit (4M x 16) Static RAM
CY62187EV18* MoBL®	64 Mbit (4M x 16) Static RAM
CY62187EV30* MoBL®	64 Mbit (4M x 16) Static RAM

FOR ANY QUESTIONS ON THIS REPORT, PLEASE CONTACT
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PRODUCT QUALIFICATION HISTORY

QTP Number	Description of Qualification Purpose	Date Comp
054302	R95LD-3R, Fab 4 and New Device CY7C62xxx (4Meg) MoBL Product Family	Dec 05
071302	16Meg Rev. B MoBL Product Family, R95LD-R Technology at Fab4	Mar 07
091602	Qualify R95 64M MoBL SRAM (7C62187F, 4 stacked die of qualified R95 16M) R95LD-3R Technology, Fab4	Oct 09
131003	Qualify polyimide mask to qualified Industrial 64M (7C62185FC) MoBL SRAM, R95LD-3R Technology, Fab 4	Oct 13

PRODUCT DESCRIPTION (for qualification)	
Purpose: Qualify R95 64M MoBL SRAM (7C62187F, 4 stacked die of qualified R95 16M) R95LD-3R Technology, Fab4	
Marketing Part #:	CY62187EV18LL-*, CY62187EV30LL-*, CY62187ELL-*
Device Description:	1.8V/3V/5V 64M (4MX16) MoBL SRAM
Cypress Division:	Cypress Semiconductor Corporation –Memory Product Division (MPD)

TECHNOLOGY/FAB PROCESS DESCRIPTION – R95LD-3R			
Number of Metal Layers:	2	Metal Composition:	Metal 1: 100Å Ti / 3200Å Al / 300Å TiW Metal 2: 150Å Ti / 8000Å Al / 300Å TiW
Passivation Type and Materials:	1000Å Oxide TEOS / 9000Å Nitride		
Generic Process Technology/Design Rule (μ-drawn):	CMOS, Double Metal, 0.09μm		
Gate Oxide Material/Thickness (MOS):	28Å		
Name/Location of Die Fab (prime) Facility:	Cypress Semiconductor -- Bloomington, MN		
Die Fab Line ID/Wafer Process ID:	Fab4/R95LD-3R		

PACKAGE AVAILABILITY

PACKAGE	ASSEMBLY SITE FACILITY
48-Ball FBGA	ASE-TAIWAN (G), CML-RA

Note: Package Qualification details upon request

MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION	
Package Designation:	BK48
Package Outline, Type, or Name:	48 Ball- Ball Grid Array (BGA)
Mold Compound Name/Manufacturer:	KE-G2270
Mold Compound Flammability Rating:	V-O per UL94
Mold Compound Alpha Emission Rate:	0.001c/cm2-h
Oxygen Rating Index:	NA
Lead Frame Material:	NA
Lead Finish, Composition / Thickness:	SnAgCu (SAC405)
Die Backside Preparation Method/Metallization:	Back grind
Die Separation Method:	100% Saw Through
Die Attach Supplier:	NEXEL Industries
Die Attach Material:	NEX-130E4X
Die Attach Method:	Film Over Wire
Bond Diagram Designation:	001-49342
Wire Bond Method:	Thermosonic
Wire Material/Size:	Au, 0.8mil
Thermal Resistance Theta JA °C/W:	28.71 °C/W
Package Cross Section Yes/No:	N/A
Assembly Process Flow:	001-56462
Name/Location of Assembly (prime) facility:	Taiwan-G
MSL Level	3
Reflow Profile	260C

Name/Location of Assembly (prime) facility:	
Test Location :	CML-RA, KYEC, Taiwan

Note: Please contact a Cypress Representative for other packages availability

RELIABILITY TESTS PERFORMED PER SPECIFICATION REQUIREMENT

Stress/Test	Test Condition (Temp/Bias)	Result P/F
High Temperature Operating Life Early Failure Rate	Dynamic Operating Condition, Vcc Max = 1.85V, 125°C JESD22-A108	P
High Temperature Operating Life Latent Failure Rate	Dynamic Operating Condition, Vcc Max = 1.85V, 150°C Dynamic Operating Condition, Vcc Max = 1.85V, 125°C JESD22-A108	P
Long Life Verification	Dynamic Operating Condition, Vcc = 1.85V, 150°C JESD22-A108	P
High Temperature Steady State Life	Static Operating Condition, Vcc Max = 1.75V, 125°C JESD22-A108	P
Low Temperature Operating Life	Dynamic Operating Condition, Vcc = 2.0V, -30°C JESD22-A108	P
High Accelerated Saturation Test (HAST)	JEDEC STD 22-A110: 130°C, 3.63V/5.5V, 85%RH Precondition: JESD22 Moisture Sensitivity MSL 3 192 Hrs, 30°C/60%RH+ Reflow, 260°C+0, -5°C	P
Temperature Cycle	MIL-STD-883, Method 1010, Condition C, -65°C to 150°C Precondition: JESD22 Moisture Sensitivity MSL 3 192 Hrs, 30°C/60%RH+ Reflow, 260°C+0, -5°C	P
Pressure Cooker	JESD22-A102: 121°C, 100%RH, 15 Psig Precondition: JESD22 Moisture Sensitivity MSL 3 192 Hrs, 30°C/60%RH+ Reflow, 260°C+0, -5°C	P
High Temperature Storage	JESD22-103: 150°C, no bias	P
Electrostatic Discharge Human Body Model (ESD-HBM)	2,200V MIL-STD-883, Method 3015.7	P
Electrostatic Discharge Human Body Model (ESD-HBM)	2,200V JEDEC EIA/JESD22-A114	P
Electrostatic Discharge Charge Device Model (ESD-CDM)	500V, JESD22-C101	P
Alpha Particle Sensitivity	0.001 CPH/Cm ²	P
Current Density	Meets the Technology Device Level Reliability Specifications	P
Age Bond Strength	200°C, 4HRS MIL-STD-883, Method 883-2011	P
Acoustic Microscopy	J-STD-020 Precondition: JESD22 Moisture Sensitivity MSL 3 192 Hrs, 30°C/60%RH+ Reflow, 260°C+0, -5°C	P
Dynamic Latch up	JESD78	P
Static Latch up	125C, ± 200/300mA JESD78	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	1,403 Devices	0	N/A	N/A	0 PPM
High Temperature Operating Life ^{1,2} Long Term Failure Rate	1, 342, 700 DHRs	1	0.7	170	10 FIT
				55	

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.

Reliability Test Data

QTP #: 054302

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
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STRESS: ACOUSTIC-MSL3

CY62147EV30LL (7C62147F)	4438656	610461414	CML-RA	COMP	15	0	
CY62147EV30LL (7C62147F)	4519690	610533058	CML-RA	COMP	15	0	
CY62147EV30LL (7C62147F)	4447261	610506302N	CML-R	COMP	15	0	

STRESS: AGE BOND STRENGTH

CY62147EV30LL (7C62147F)	4514985	610527600	CML-R	COMP	10	0	
CY62136EV30LL (7C62136F)	4516742	610537839	CML-R	COMP	10	0	
CY62147EV30LL (7C62147F)	4516646	610527599	CML-R	COMP	10	0	

STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE, 125C, 1.85V, Vcc Max

CY62147EV30LL (7C62147F)	4438656	610461414	CML-RA	96	679	0	
CY62147EV30LL (7C62147F)	4527847	610558767	CML-R	96	4031	0	
CY62147EV30LL (7C62147F)	4519690	610533058	CML-RA	96	1711	0	
CY62147EV30LL (7C62147F)	4447261	610506302N	CML-R	96	917	1	Single Bit (Non-visual)

STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE, 150C, 1.85V, Vcc Max

CY62147EV30LL (7C62147F)	4438656	610461414	CML-RA	80	400	0	
CY62147EV30LL (7C62147F)	4438656	610461414	CML-RA	500	400	1	Blocked contact at Poly
CY62147EV30LL (7C62147F)	4519690	610533058	CML-RA	80	400	0	
CY62147EV30LL (7C62147F)	4519690	610533058	CML-RA	500	400	0	
CY62147EV30LL (7C62147F)	4447261	610506302N	CML-R	80	400	0	
CY62147EV30LL (7C62147F)	4447261	610506302N	CML-R	500	400	0	

STRESS: LONG LIFE VERIFICATION, 150C, 1.85V, Vcc Max

CY62147EV30LL (7C62147F)	4519690	610533058	CML-RA	1000	393	0	
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STRESS: HIGH TEMPERATURE STEADY STATE LIFE, 125C, 1.75V, Vcc Max

CY62147EV30LL (7C62147F)	4438656	610461414	CML-RA	168	76	0	
CY62147EV30LL (7C62147F)	4438656	610461414	CML-RA	336	75	0	

STRESS: LOW TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE, -30C, 2.0V, Vcc

CY62147EV30LL (7C62147F)	4447261	610506302N	CML-R	500	45	0	
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STRESS: HIGH TEMPERATURE STORAGE

CY62147EV30LL (7C62147F)	4438656	610461414	CML-RA	500	45	0	
CY62147EV30LL (7C62147F)	4438656	610461414	CML-RA	1000	45	0	

Reliability Test Data

QTP #: 054302

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
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STRESS: ESD-CHARGE DEVICE MODEL, 500V

CY62147EV30LL (7C62147F)	4527847	610548767	CML-R	COMP	9	0	
CY62148EV30LL (7C62148F)	4527847	610548491	TAIWN-G	COMP	9	0	
CY62148EV30LL (7C62148F)	4527847	610550592	CML-RA	COMP	9	0	
CY62147EV30LL (7C62147F)	4516646	610527599	CML-R	COMP	9	0	
CY62147EV30LL (7C62147F)	4514985	610527600	CML-R	COMP	9	0	
CY62147EV30LL (7C62147F)	4519690	610533058	CML-RA	COMP	9	0	

STRESS: ESD-HUMAN BODY CIRCUIT PER JEDEC EIA/JESD22-A114, 2,200V

CY62147EV30LL (7C62147F)	4527847	610548767	CML-R	COMP	9	0	
CY62148EV30LL (7C62148F)	4527847	610548491	TAIWN-G	COMP	9	0	
CY62148EV30LL (7C62148F)	4527847	610551587	CML-R	COMP	9	0	
CY62148EV30LL (7C62148F)	4527847	610550592	CML-RA	COMP	9	0	
CY62147EV30LL (7C62147F)	4516646	610527599	CML-R	COMP	9	0	
CY62147EV30LL (7C62147F)	4514985	610527600	CML-R	COMP	9	0	
CY62147EV30LL (7C62147F)	4519690	610533058	CML-RA	COMP	9	0	

STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015, 2,200V

CY62147EV30LL (7C62147F)	4527847	610548767	CML-R	COMP	3	0	
CY62148EV30LL (7C62148F)	4527847	610548491	TAIWN-G	COMP	3	0	
CY62148EV30LL (7C62148F)	4527847	610551587	CML-R	COMP	3	0	
CY62148EV30LL (7C62148F)	4527847	610550592	CML-RA	COMP	3	0	
CY62147EV30LL (7C62147F)	4516646	610527599	CML-R	COMP	3	0	
CY62147EV30LL (7C62147F)	4514985	610527600	CML-R	COMP	3	0	
CY62147EV30LL (7C62147F)	4519690	610533058	CML-RA	COMP	3	0	

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

CY62137EV30LL (7C62137F)	4516742	610539321	CML-R	128	45	0	
CY62137EV30LL (7C62137F)	4516742	610539321	CML-R	256	45	0	
CY62137EV30LL (7C62137F)	4516742	610539321	CML-R	128	54	0	

STRESS: HI-ACCEL SATURATION TEST, 130C, 85%RH, 5.5V, PRE COND 192 HR 30C/60%RH, MSL3

CY62147EV30LL (7C62147F)	4527847	610558767	CML-R	128	45	0	
CY62147EV30LL (7C62147F)	4527847	610558767	CML-R	264	45	0	

Reliability Test Data

QTP #: 054302

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
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STRESS: DYNAMIC LATCH-UP TESTING, 9.0V

CY62147EV30LL (7C62147F)	4438656	610461414	TAIWN-G	COMP	3	0	
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STRESS: STATIC LATCH-UP TESTING, 125C, 6.5V, +/-300mA

CY62147EV30LL (7C62147F)	4514985	610527600	CML-R	COMP	3	0	
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STRESS: STATIC LATCH-UP TESTING, 125C, 10V, +/-300mA

CY62147EV30LL (7C62147F)	4527847	610548767	CML-R	COMP	3	0	
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STRESS: STATIC LATCH-UP TESTING, 125C, 9.5V, +/-300mA

CY62147EV30LL (7C62147F)	4516646	610527599	CML-R	COMP	3	0	
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CY62147EV30LL (7C62147F)	4519690	610533058	CML-RA	COMP	3	0	
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STRESS: STATIC LATCH-UP TESTING, 125C, 8.5V, +/-200mA

CY62148EV30LL (7C62148F)	4527847	610548491	TAIWN-G	COMP	3	0	
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CY62148EV30LL (7C62148F)	4527847	610551587	CML-R	COMP	3	0	
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CY62148EV30LL (7C62148F)	4527847	610550592	CML-RA	COMP	3	0	
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STRESS: PRESSURE COOKER TEST, 121C, 100%RH, 15 Psig, PRE COND 192 HR 30C/60%RH, MSL3

CY62147EV30LL (7C62147F)	4516742	610537714	CML-R	168	50	0	
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CY62147EV30LL (7C62147F)	4516742	610537714	CML-R	288	50	0	
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CY62147EV30LL (7C62147F)	4516646	610537739	CML-R	168	50	0	
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CY62147EV30LL (7C62147F)	4516646	610537739	CML-R	288	50	0	
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CY62147EV30LL (7C62147F)	4519690	610533058	CML-RA	168	50	0	
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STRESS: TC COND. C -65C TO 150C, PRE COND 192 HRS 30C/60%RH, MSL3

CY62147EV30LL (7C62147F)	4438656	610461414	CML-RA	300	42	0	
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CY62147EV30LL (7C62147F)	4519690	610533058	CML-RA	300	49	0	
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CY62147EV30LL (7C62147F)	4519690	610533058	CML-RA	500	48	0	
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CY62147EV30LL (7C62147F)	4519690	610533058	CML-RA	1000	46	0	
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CY62147EV30LL (7C62147F)	4447261	610506302N	CML-R	300	45	0	
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CY62147EV30LL (7C62147F)	4447261	610506302N	CML-R	500	44	0	
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CY62147EV30LL (7C62147F)	4447261	610506302N	CML-R	1000	44	0	
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Reliability Test Data

QTP #: 071302

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
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STRESS: ACOUSTIC-MSL3

CY62167EV30 (7C62167F)	4631509	610672951	TAIWN-G	COMP	15	0	
CY62167EV30 (7C62167F)	4632963	610702733	TAIWN-G	COMP	15	0	
CY62167EV30 (7C62167F)	4632963	610702735	TAIWN-G	COMP	15	0	

STRESS: ESD-CHARGE DEVICE MODEL, 500V

CY62167EV30 (7C62167F)	4631509	610672951	TAIWN-G	COMP	9	0	
CY62167EV30 (7C62167F)	4632963	610704952	TAIWN-G	COMP	9	0	

STRESS: ESD-HUMAN BODY CIRCUIT PER JEDEC EIA/JESD22-A114-B, 2,200V

CY62167EV30 (7C62167F)	4631509	610672951	TAIWN-G	COMP	8	0	
CY62167EV30 (7C62167F)	4632963	610704952	TAIWN-G	COMP	8	0	

STRESS: DYNAMIC LATCH-UP TESTING, 8.6V

CY62167EV30 (7C62167F)	4631509	610672951	TAIWN-G	COMP	3	0	
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STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE, 125C, 1.85V, Vcc Max

CY62167EV30 (7C62167F)	4631509	610672951	TAIWN-G	96	1909	0	
CY62167EV30 (7C62167F)	4632963	610702733	TAIWN-G	96	1833	0	

STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE, 150C, 1.85V, Vcc Max

CY62167EV30 (7C62167F)	4631509	610672951	TAIWN-G	80	400	0	
CY62167EV30 (7C62167F)	4631509	610672951	TAIWN-G	500	400	0	
CY62167EV30 (7C62167F)	4632963	610702733	TAIWN-G	80	399	0	
CY62167EV30 (7C62167F)	4632963	610702733	TAIWN-G	500	399	0	

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

CY62167EV30 (7C62167F)	4631509	610672951	TAIWN-G	128	44	0	
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STRESS: PRESSURE COOKER TEST, 121C, 100%RH, 15 Psig, PRE COND 192 HR 30C/60%RH, MSL3

CY62167EV30 (7C62167F)	4631509	610672951	TAIWN-G	168	50	0	
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STRESS: STATIC LATCH-UP TESTING, 125C, 8.5V, +/-200mA

CY62167EV30 (7C62167F)	4631509	610672951	TAIWN-G	COMP	3	0	
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STRESS: STATIC LATCH-UP TESTING, 125C, 8.3V, +/-200mA

CY62167EV30 (7C62167F)	4632963	610704952	TAIWN-G	COMP	3	0	
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Reliability Test Data

QTP #: 071302

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
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STRESS: TC COND. C -65C TO 150C, PRE COND 192 HRS 30C/60%RH, MSL3

CY62167EV30 (7C62167F)	4631509	610672951	TAIWN-G	500	50	0	
CY62167EV30 (7C62167F)	4631509	610672951	TAIWN-G	1000	50	0	
CY62167EV30 (7C62167F)	4632963	610702733	TAIWN-G	300	50	0	
CY62167EV30 (7C62167F)	4632963	610702733	TAIWN-G	500	50	0	
CY62167EV30 (7C62167F)	4632963	610702735	TAIWN-G	300	50	0	

Reliability Test Data

QTP #: 091602

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
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STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE, 125C, 1.85V, Vcc Max

CY62187E (7C62187FC)	4907708	610921692	TAIWN-G	96	1403	0	
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STRESS: ESD-CHARGE DEVICE MODEL, 500V

CY62187E (7C62187FC)	4834118	610911267	TAIWN-G	COMP	9	0	
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CY62187E (7C62187FC)	4836722	610910782	TAIWN-G	COMP	9	0	
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STRESS: ESD-HUMAN BODY CIRCUIT PER JEDEC EIA/JESD22-A114, 2,200V

CY62187E (7C62187FC)	4834118	610911267	TAIWN-G	COMP	8	0	
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STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE, 125C, 1.85V, Vcc Max

CY62187E (7C62187FC)	4907708	610921692	TAIWN-G	168	400	0	
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STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE, 150C, 1.85V, Vcc Max

CY62167EV30 (7C62167FC)	4631509	610672951	TAIWN-G	80	400	0	
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CY62167EV30 (7C62167FC)	4631509	610672951	TAIWN-G	500	400	0	
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STRESS: STATIC LATCH-UP TESTING, 125C, 5.4V, +/-200mA

CY62187E (7C62187FC)	4834118	610911267	TAIWN-G	COMP	6	0	
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STRESS: THERMAL JUNCTION

CY62187E (7C62187FC)	4834118	610911267	TAIWN-G	COMP	2	0	
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Reliability Test Data

QTP #: 131003

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE, 150C, 1.85V, Vcc Max (Core)							
CY62157EV30LL (7C62157F)	4229219	611238363	CML-RA	168	76	0	
CY62157EV30LL (7C62157F)	4229219	611238363	CML-RA	1000	76	0	
STRESS: TC COND. C -65C TO 150C, PRE COND 192 HRS 30C/60%RH, MSL3							
CY62157EV30LL (7C62157F)	4229219	611238363	CML-RA	500	77	0	
CY62157EV30LL (7C62157F)	4229219	611238363	CML-RA	1000	76	0	
STRESS: PRESSURE COOKER TEST, 121C, 100%RH, 15 Psig, PRE COND 192 HR 30C/60%RH, MSL3							
CY62157EV30LL (7C62157F)	4229219	611238363	CML-RA	96	76	0	
CY62157EV30LL (7C62157F)	4229219	611238363	CML-RA	168	65	0	
STRESS: HI-ACCEL SATURATION TEST, 110C, 85%RH, 1.85V, PRE COND 192 HR 30C/60%RH, MSL3							
CY62157EV30LL (7C62157F)	4229219	611238363	CML-RA	128	77	0	
CY62157EV30LL (7C62157F)	4229219	611238363	CML-RA	264	77	0	
STRESS: HIGH TEMPERATURE STORAGE							
CY62157EV30LL (7C62157F)	4229219	611238363	CML-RA	1000	77	0	
STRESS: INTERNAL VISUAL							
CY62157EV30LL (7C62157F)	4229219	611238363	CML-RA	COMP	5	0	
STRESS: SORT YIELD							
7C62185FC	VARIOUS	NA	NA	COMP	COMPARABLE		
STRESS: E-TEST YIELD							
7C62185FC	VARIOUS	NA	NA	COMP	COMPARABLE		

Document History Page

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Rev.	ECN No.	Orig. of Change	Description of Change
**	4033666	ILZ	Initial Spec Release Qualification report published on Cypress.com is documented on memo HGA-973 and not in spec format. Initiated spec for QTP 091602 and all data from memo# HGA-973 was transferred to qualification report spec template. Deleted package qualification details on package qualification history table. Deleted Cypress reference Spec and replaced with Industry Standards Updated package availability based on current qualified test & assembly site.
A	4163588	JYF	Updated QTP title page: <ul style="list-style-type: none"> - Changed title of QA Engineering Director to Reliability Director; - Added CY62187E and CY62187EV18* in the device coverage to align with the part nos. in Product Description table; Updated device division from MID to MPD; Complete re-write of Reliability Tests Performed table to align with spec template; Added PMM QTP data (QTP# 131003).
*B	4417735	JYF	Sunset Review: Updated QTP title page for template alignment.

Distribution: WEB

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