Automotive/ Industrial/ Multi-Market Qualification Report Summary

Objective: **To Qualify Anguilla 3M59B Mask Set Change - ADC Improvement (4 layers RPO, N+, P+, M3)**

Freescale PN: MC56F80XX Part Name: Anguilla	Customer Name(s): Various PN(s):	Plan or Results: **0** Revision # & Date: **22-Jun-10**
Technology: E025AFXQ Package: LQFP 32 7*7*1.4P0.8	Design Engr: Bishnoi Navin-B12218 Phone #: 91-120-3952123	166399 QUARTZ Tracking #: 181061
Fab / Assembly / Final Test Sites: TSMC11/ASECL/ASECL	Product Engr: Tee Swee.San-R64732 Phone #: 6-03-78732875	(Signature/Date shown below may be electronic)
Maskset#: M59B Rev#: 3	Prod. Package Engr: Phone #: not required	PPE Approval (for DIM/BOM results) Signature & Date: not required, existing BOM used
Die Size (in mm) W x L x T 3.070 x 3.070 mm	NPI PRQE: Miza Ismail - r27786 Phone #: 603 78732723	NPI PRQE Approval Miza Ismail - r27786 Signature & Date:
Part Operating Temp. Grade: Grade 1 -40C to 125C	Trace/DateCode: LOT A WK1982.02; LOT B WK2158.02; LOT C WK1985.02	CAB Approval 09402829M Signature & Date: 30-Jun-2010
Target Dates Test Start: 11/30/10 Test Finish: 06/28/10		Customer Approval Signature & Date: not required

(see Instruction #8 for use of rows 10-13; see examples below)

TESTS HIGHLIGHTED IN YELLOW WERE PERFORMED FOR THIS STUDY

This testing is performed by Freescale Reliability Lab (KLM) unless otherwise noted in the Comments.

GROUP A - ACCELERATED ENVIRONMENTAL STRESS TESTS

Stress Test	Reference	Test Conditions	End Point Requirements	Minimum Sample Size (Note 1)	# of Lots	Total Units including spares	Results Lot ID-(#Rej/SS) NA=Not Applicable	Comments (Note 2)
PC	JESD22-A113 J-STD-020	**Preconditioning (PC) :** PC required for SMDs only. MSL 3 @ 260°C, +5/-0°C (or document otherwise with justification)	TEST @ RHC	All surface mount devices prior to THB, HAST, AC, UHST, TC, PC+PTC and as required per test conditions.				not required
PC	JESD22-A113 J-STD-020	**Preconditioning (PC) :** PC required for SMDs only. MSL 3 @ 260°C, +5/-0°C CSAM before and after	CSAM	CSAM SS=11 units per qualification lot				not required
HAST	JESD22-A101 A110	**Highly Accelerated Stress Test (HAST):** PC before HAST (for SMDs only): Required HAST = 130°C/85%RH for 96 hrs. Bias = Max Vdd (or justify othrwise) *Timed RO of 48hrs. MAX*	TEST @ RH	77	0	0	pass	Generic data : 3M67E (Q120497) : 0/240 @ 1008hrs THB
AC	JESD22-A102 A118	**Autoclave (AC):** PC before AC (for SMDs only): Required AC = 121°C/100%RH/15 psig for 96 hrs *Timed RO of 2-48hrs. MAX*	TEST @ R	77	0	0		not required
TC	JESD22-A104 AEC Q100-	**Temperature Cycle (TC):** PC before TC (for SMDs only): Required TC = -65°C to 150°C for 500 cycles.	TEST @ RHC For AEC: WBP =/> 3 grams	77	0	0		not required
HTSL	JESD22-A103	**High Temperature Storage Life (HTSL):** 150°C for 1000 hrs (Devices incorporating NVM shall receive 'NVM endurance preconditioning'(EDR) prior to this test, and special NVM test sequencing after this test; see AEC-Q100 for details) *Timed RO = 96hrs. MAX*	TEST @ RHC	77	0	0	pass	Generic data : 3M67E (Q120497) : 0/240 @ 1008hrs, 150C

TEST GROUP B - ACCELERATED LIFETIME SIMULATION TESTS

Stress Test	Reference	Test Conditions	End Point Requirements	Minimum Sample Size	# of Lots	Total Units including spares	Results Lot ID-(#Rej/SS) NA=Not Applicable	Comments or Generic Data
HTOL (Non Burn In Flow)	JESD22-A108	**High Temperature Operating Life (HTOL):** AEC Ta = 125°C (Tj = 135C) for 168hrs (qual), 1008hrs (fyi) Bias = IO : 3.8V, Core : 2.9V Prior to HTOL, W/E 10k @ 125C *Timed RO of 96hrs. MAX*	TEST @ HC	77	3	231	Lot A: 0/80 Lot B: 0/80 Lot C: 0/80	Generic data for Non BI Flow: 3M67E (Q120497) : 0/240 @ 125C, 741hrs, 1008hrs (RHC) 4M67E (Q136498) : 0/80 @ 125C, 168hrs (RHC)
HTOL (BI flow)	JESD22-A108	**High Temperature Operating Life (HTOL):** AEC Ta = 125°C for 168hrs (qual), 1008hrs (fyi) Bias = IO : 3.8V, Core : 2.9V Prior to HTOL, W/E 10k @ 125C *Timed RO of 96hrs. MAX*	TEST @ RHC	77	3	231	Lot A: 0/80 Lot B: 0/80 Lot C: 0/80	Generic data for BI Flow : 3M67E (Q120497) : 0/240 @ 125C, 741hrs, 1008hrs (RHC) 2M59B (84057) : 0/240 @ 150C, 504hrs (RHC)
EDR	AEC Q100-005	**NVM Endurance <u>at Cold</u>, Data Retention, and Operational Life (EDR):** **W/E @ -40C -> DRB @ 150 for 1008hrs** Devices incorporating NVM shall receive 'NVM endurance preconditioning'(W/E cycling). Test R, H, C after W/E cycling. *Timed RO of 96hrs. MAX*	TEST @ RHC	90	0	0		not required
EDR	AEC Q100-005	**NVM Endurance <u>at Hot</u>, Data Retention, and Operational Life (EDR):** **W/E @ 125C -> DRB @ 150 for 1008hrs** Devices incorporating NVM shall receive 'NVM endurance preconditioning'(W/E cycling). Test R, H, C after W/E cycling. *Timed RO of 96hrs. MAX*	TEST @ RHC	90	0	0		not required

TEST GROUP C - PACKAGE ASSEMBLY INTEGRITY TESTS

Stress Test	Reference	Test Conditions	End Point Requirements	Minimum Sample Size	# of Lots	Total Units including spares	Results Lot ID-(#Rej/SS) NA=Not Applicable	Comments or Generic Data
WBS	AEC Q100-001	**Wire Bond shear (WBS)**	Cpk = or > 1.67	30 bonds from minimum 5 units	0	0		not required
WBP	MilStd883-2011	**Wire Bond Pull (WBP):** Cond. C or D	Cpk = or > 1.67	30 bonds from minimum 5 units	0	0		not required
SD	JESD22-B102	**Solderability (SD):** 8hr.(1 hr. for Au-plated leads) Steam age prior to test. If production burn-in is done, samples must also undergo burn-in prior to SD.	>95% lead coverage of critical areas	15	0	0		not required
PD	JESD22-B100	**Physical Dimensions(PD):** PD per FSL 98A drawing	Cpk = or > 1.67	10	0	0		not required

DIM & BOM		**Dimensional (DIM):** PPE to verify PD results against valid 98A drawing. **BOM Verification (BOM):** PPE to verify qual lot ERF BOM is accurate.					DIM: BOM:	not required
SBS	AEC-Q100-010	**Solder Ball Shear (SBS):** Performed on all solder ball mounted packages e.g. PBGA, Chip Scale, Micro Lead Frame (but NOT Flip Chip). Two reflow cycles at MSL reflow temperature before shear.	Cpk = or >1.67	10 (5 balls from a min. of 10 devices)	0	0		not required
LI	JESD22-B105	**Lead Integrity (LI):** Not required for surface mount devices; Only required for through-hole devices.	No lead breakage or cracks	5 (10 leads from each of 5 parts)	0	0		
TEST GROUP E - ELECTRICAL VERIFICATION TESTS								
Stress Test	**Reference**	**Test Conditions**	**End Point Requirements**	**Minimum Sample Size**	**# of Lots**	**Total Units including spares**	**Results** Lot ID-(#Rej/SS) NA=Not Applicable	**Comments or Generic Data**
HBM	AEC-Q100-002 / JESD22-A114E Jan 2007	**ElectroStatic Discharge/** **Human Body Model Classification (HBM):** Test @ 500/1000/1500/2000 Volts For AEC, see AEC-Q100-002 for classification levels.	TEST @ RH 2KV min.	3 units per Voltage level	1	15	Lot A: 500V: 0/3 1kV: 0/3 1.5kV: 0/3 2kV: 0/3	
MM	AEC-Q100-003 or JESD22	**ElectroStatic Discharge/** **Machine Model Classification m(MM):** Test @ 50/100/200 Volts For AEC, see AEC-Q100-003 for classification levels.	TEST @ RH 200V min.	3 units per Voltage level	1	12	Lot A: 50V: 0/3 100V: 0/3 150V: 0/3 200V: 0/3	
CDM	AEC-Q100-011	**ElectroStatic Discharge/** **Charged Device Model Classification (CDM):** Test @ 250/500/750cp Volts For AEC, see AEC-Q100-011 for classification levels. ***Timed RO of 96hrs MAX.***	TEST @ RH All pins =/> 500V For AEC, Corner pins =/> 750V;	3 units per Voltage level	1	12	Lot A: 250V: 0/3 500V: 0/3 750V cp: 0/3	
LU	JESD78 plus AEC-Q100-004 for AEC	**Latch-up (LU):** Test per JEDEC JESD78 with the AEC-Q100-004 requirements for AEC. Ta= Maximum operating temperature Vsupply = Maximum operating voltage	TEST @ RH	6	1	6	Lot A: 0/6	
ED	AEC-Q100-009, Freescale 48A spec	**Electrical Distribution (ED)** pre and post HTOL	TEST @ RHC For AEC, Cpk target > 1.67	30	3	90	Cpk > 1.67	
CHAR	For AEC, AEC-Q003	**Characterization (CHAR):** Ony performed on new technologies and part families per AEC Q003.						
GL (for information only)	For AEC, AEC-Q100-006	**Electro-Thermally Induced Gate Leakage (GL):** 155℃, 2.0 min, +400/-400 V Per AEC Q100 Rev G, this test is performed for information only. *Timed RO of 96 hrs MAX.* *For all failures, perform unbiased bake (4hrs/125℃, or 2hrs/150℃) and retest; recovered uni*	TEST @ R	6	0	0		not required

BOM Information of Qual Vehicles :

Part Number	Moo Number	Die Size	Quartz	Wafer Fab/ Polymide	Die Attach	Mold Compound	Leadframe Flagsize	Wire
MC56F80XXX	3M59B	3.070 x 3.070 mm	166399 181061	TSMC11 / 8124	EN4900G	CEL9240HF	Cu Frame 5x5	0.98mils

Generic Data:

Part Number	Moo Number	Die Size	Quartz	Wafer Fab/ Polymide	Die Attach	Mold Compound	Leadframe Flagsize	Wire
MC56F802/3XXXX	3M67E 4M67E	3.820 x 3.820mm	120497 (3M) and 136498 (4M)	ATMC	EN4900G	CEL9240HF	Cu Frame	0.98mils

Revision	Date	Comments	Author
Rev O	22-Jun-10	Qualification Report	Miza Ismail