

Commercial/Industrial Tier Qual Report

Objective: Anguilla Black 4M53V Maskset Revision Qualification			
Freescale PN: 56F8257MLH, 56F8247, 56F8257 Part Name: Anguilla Black		Customer Name(s): "Varies" PN(s): "Varies"	
Technology: E025AFXQ / 0.25SGF Package: 64LQFP		Plan or Results: Revision # & Date: Refer below for details	
Design Engr: Pandey Vipin-B01042		3rd rev: 221325, QUARTZ Tracking #: 4th rev: 24690	
Fab / Assembly / Final Test Sites: CHD / TJN / TJN		Product Engr: Ng Jing Tao-B34176/ XIE Kirdy-B12140 (Signature/Date shown below may be electronic)	
Maskset#: M53V Rev#: 4		GAO Approval (for DIM/BOM results) Signature & Date: Not Application	
Die Size (in mm) W x L 4.786 x 3.825		Nurazah Ahmad-R63712 NPI PRQE Approval Signature & Date: 16 Jan 2014	
Part Operating Temp. Grade: Grade 1 -40 °C to + 125°C		NPI PRQE: Nurazah Ahmad- R63712	
Trace/DateCode:		LOT A (3rd mask) TH34150.1T	
		LOT B (4th Mask) 8EME0085U4 00	
		CAB Approval 12241421M Signature & Date: 16 Jan 2014	
		Customer Approval Signature & Date: Not Applicable	

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

GROUP A - ACCELERATED ENVIRONMENTAL STRESS 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
PC	JESD22-A113 J-STD-020	Preconditioning (PC) : PC required for SMDs only. MSL 3 @ 260°C, +5/-0°C	TEST @ RH				Pass	Re-use data: Anguilla Black, 56F804x (0M53V), 64LQFP, Q160400, 0/693
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 = 5.5V Timed RO of 48hrs. MAX	TEST @ RH	77	0	0	Pass	Re-use data: Anguilla Black, 56F804x (0M53V), 64LQFP, Q160400, 0/231
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	Pass	Re-use data: Anguilla Black, 56F804x (0M53V), 64LQFP, Q160400, 0/231

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TC	JESD22-A104 AEC Q100-Appendix 3	Temperature Cycle (TC): PC before TC (for SMDs only): Required TC = -65°C to 150°C for 500 cycles.	TEST @ H	77	0	0	Pass	Refer below for details Re-use data: Anguilla Black, 56F804x (0M53V), 64LQFP, Q160400, 0/231
PC + PTC	JESD22-A105	Preconditioning plus Power Temperature Cycle (PC+PTC): (See AEC-Q100 for test applicability criteria) PC before PC+PTC (for SMDs only) PC= MSL @ °C, +5/-0°C PTC = °C to °C for 1000 cycles; Bias = Not required	TEST @ RH	22+3 SMD only	0	0	Pass	Re-use data: Anguilla Black, 56F804x (0M53V), 64LQFP, Q160400, 0/231
PTC	JESD22-A105	Power Temperature Cycle (PTC): (See AEC-Q100 for test applicability.) PTC = °C to °C for 1000 cycles; Bias = Not required	TEST @ RH	23+3 SMDs; 45+3 non-SMD	0	0	Pass	Re-use data: Anguilla Black, 56F804x (0M53V), 64LQFP, Q160400, 0/231
HTSL	JESD22-A103	High Temperature Storage Life (HTSL): 150°C for 1008 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 @ RH	77	0	0	Pass	Re-use data: Anguilla Black, 56F804x (0M53V), 64LQFP, Q160400, 0/77
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	JESD22-A108	High Temperature Operating Life (HTOL): Ta = 125°C for 168 hrs Bias =2.9V(Core), 3.8V (IO) 10k W/E at 125C required prior to HTOL Timed RO of 96 hrs MAX	TEST @ RHC	77	1	77	Lot B: 0/77	Generic Data: Anguilla Black, 56F804x (2M53V), 64LQFP, Q168118, 0/231 (1008hrs) Anguilla Black, 56F804x (3M53V), 64LQFP, Q221325, 0/77 (587 hrs)
ELFR	AEC Q100-008	Early Life Failure Rate ELFR): Ta = 125°C for 48 hrs; Bias = 2.8V Timed RO of 48 hrs MAX	TEST @ RH	611	0	0	Pass	Generic Data: Anguilla Black, 56F804x (2M53V), 64LQFP, Q168118, 0/2400

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EDR	AEC Q100-005	NVM Endurance, Data Retention, and Operational Life (EDR): 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	77	0	0	Pass	Refer below for details
								Generic data: Anguilla Black, 56F804x (2M53V), 64LQFP, Q168118, 0/231

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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	Pass	Generic Data: Anguilla Black, 56F804x (2M53V), 64LQFP, Cpk> 1.67
WBP	MilStd883-2011	Wire Bond Pull (WBP): Cond. C or D	Cpk = or > 1.67	30 bonds from minimum 5 units	0	0	Pass	Generic Data: Anguilla Black, 56F804x (2M53V), 64LQFP, Cpk >1.67
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	Pass	Generic Data: Anguilla Black, 56F804x (2M53V), 64LQFP, Pass
PD	JESD22-B100	Physical Dimensions(PD): PD per FSL 98A drawing	Cpk = or > 1.67	10	0	0	Pass	Generic Data: Anguilla Black, 56F804x (2M53V), 64LQFP, Cpk> 1.67
DIM & BOM		Dimensional (DIM): GAO to verify PD results against valid 98A drawing. BOM Verification (BOM): GAO to verify qual lot ERF BOM is accurate.					DIM: PASS BOM: PASS	
SBS	AEC-Q100-010	Solder Ball Shear (SBS): Performed on all solder ball mounted packages e.g. PBGA, Chip Scale, Micro Lead Frame (but <u>NOT</u> 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	For solder ball mounted packages only; <u>NOT</u> for Flip Chips.
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	Not required	Not required
TEST GROUP D - DIE FABRICATION RELIABILITY 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
EM		Electro Migration (EM)						The data, test method, calculations and internal criteria should be available to the customer upon request for new technologies.
Tddb		Time Dependent Dielectric Breakdown (Tddb)						The data, test method, calculations and internal criteria should be available to the customer upon request for new technologies.

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HCI		Hot Carrier Injection (HCI)					Refer below for details The data, test method, calculations and internal criteria should be available to the customer upon request for new technologies.
SM		Stress Migration (SM)					The data, test method, calculations and internal criteria should be available to the customer upon request for new technologies.
NBTI		Negative Bias Temperature Instability (NBTI)					The data, test method, calculations and internal criteria should be available to the customer upon request for new technologies.

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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
TEST	Freescale 48A	Pre- and Post Functional / Parametrics (TEST): For AEC, test software shall meet requirements of AEC-Q100-007. Testing performed to the limits of device specification in temperature and limit value.	0 Fails	All	All	All	See Results Summary	This action refers to Final Testing of all qualification units.
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	12	Lot A: 500V= 0/3 1000V=0/3 1500V=0/3 2000V=0/3	
MM	AEC-Q100-003 or JESD22	ElectroStatic Discharge/ Machine Model Classification m(MM): Test @ 50/100/200/400 Volts For AEC, see AEC-Q100-003 for classification levels.		3 units per Voltage level	0	0	Not required	Not required and refer to HBM. Either HBM or MM is required per AEC-Q100.
CDM	AEC-Q100-011	ElectroStatic Discharge/ Charged Device Model Classification (CDM): Test @ 250/500/750Volts For AEC, see AEC-Q100-011 for classification levels. Timed RO of 96hrs MAX.	TEST @ RH All pins => 500V	3 units per Voltage level	1	9	Lot A: 250V=0/3 500V=0/3 750V=0/3 (corner pin)	
LU	JESD78 plus AEC-Q100-004 for AEC	Latch-up (LU): Test per JEDEC JESD78 with the AEC-Q100-004 requirements for AEC. Ta= 125C Vsupply = Maximum operating voltage	TEST @ RH	6	0	0	Not required	
ED	AEC-Q100-009, Freescale 48A spec	Electrical Distribution (ED)	TEST @ RHC	5	1	5	Lot A: Pass	

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FG	For AEC, AEC-Q100-007	Fault Grading (FG)	FG shall be = or > 90% for qual units				No change, FG= >90%	Refer below for details Production Test requirement: 98% w/o lddq 95% w/lddq 100% TYPE2 faults detection
GL (for information only)	For AEC, AEC-Q100-006	Electro-Thermally Induced Gate Leakage (GL): 155°C, 2.0 min, +400/-400 V Per AEC Q100 Rev G, this test is performed for information only. <i>Timed RO of 96 hrs MAX.</i> <i>For all failures, perform unbiased bake (4hrs/125°C, or 2hrs/150°C) and retest; recovered units are GL failures.</i>	TEST @ R	6	0	0	Not required	Freescale does not plan Gate Leakage testing in alignment with the expected revision to AEC Q100 that will eliminate this "for information only" stress.
EMC	SAE J1752/3 - Radiated Emissions	Electromagnetic Compatibility (EMC) (see AEC Q100 Appendix 5 for test applicability; done on case-by-case basis per customer/Freescale agreement)	<40dBuV 150KHz - 1GHz	1	0	0	Pass	Generic Data: Anguilla Black, 56F804x (0M53V), 64LQFP, Pass

Package Qual Generic Data List:

Quartz #	Mask Set	Product-Qual Description / Part Number(s)	Die Size	Flash Size	Mold Compound	Die Attach material	CAB Number	Wire Demension
160400	0M53V	Anguilla Black NPI Qualification - 64LQFP	3.26 x 3.162 mm	Flash size: 1, 8Kx16	MC HITACHI 9200HF10M	Sumitomo CRM-1064MB	08381759M	20micron Au wire

Die Qual Generic Data List:

Quartz #	Mask Set	Product-Qual Description / Part Number(s)	Critical Parameter	Critical Parameter	Critical Parameter	Critical Parameter	CAB Number	CAB Date
168118/189878	1M53V/ 2M53V	Anguilla Black NPI Qualification- 64LQFP	3.26 x 3.162 mm	Flash size: 1, 8Kx16	MC HITACHI 9200HF10M	Sumitomo CRM-1064MB	08381759M	20micron Au wire

Revision History:

Revision	Date	Comments	Author
Rev 0	16-Jan-14	Edit final qualification report	Nurazah Ahmad