freescale semiconductor

Commercial/Industrial Qual Report

Objective:	**QFN Cu wire and E-Type Lead Frame Qual in FSL-TJN-FM**				
Freescale PN:	Varies	Customer Name(s):	"Varies"	Plan or Results:	Result
Part Name:	Varies	PN(s):	"Varies"	Revision # & Date:	See revision history
Technology:	0.25um SGF				
Package:	Varies / varies	Design Engr:	NA	QUARTZ Tracking #:	See report
Fab / Assembly / Final Test Sites:	Fab: Detail in the report/FSL-TJN-FM/test site: Detail in the report	Product Engr:	Detail in the report		(Signature/Date shown below may be electronic)
Masksetl:	Varies			DIM/BOM results)	Wang J.Q.-R30716
Revtl:	Varies	Prod. Package Engr:	Wang J.Q.-R30716	Signature & Date:	Jul-4-2014
Die Size (in mm)				NPI PRQE Approval	LONG Nancy-B07252
W x L x T	Detail in the report	NPI PRQE:	LONG Nancy-B07252	Signature & Date:	Jul-3-2014
Part Operating				CAB Approval	14080363M
Temp. Grade:	Detail in the report for each vehicle			Signature & Date:	Jul-4-2014
				Signature & Date:	NA

TESTS HIGHLIGHTED IN YELLOW WILL BE PERFORMED FOR THIS STUDY

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

Qual Vehicle A	Qual Vehicle B	Qual Vehicle C
MCF51CN128CGT(LASKO)	**S9S08AW60E5MFDE(MONET_Auto)**	**MC9S08GT60A(DRACO4)**
Masksetl: 1M72P	**Masksetl: 5M75B**	**Masksetl: 0N22A**
Fab/Tech: CHD/E025FXXQ	**Fab/Tech: CHD/E025FXXQ**	**Fab/Tech: TSMC3/E025FXXQ**
Die size(mmxmm): 4.382X4.382	**Die size(mmxmm): 2.850X2.820**	**Die size(mmxmm): 3.000X3.070**
Package: QFN 48 EP 7SQ*1.0P0.5	**Package: QFN 48 EP 7SQ*1.0P0.5**	**Package: QFN 48 EP 7SQ*1.0P0.5**
Operation Temperature: -40C to 85C	**Operation Temperature: -40C to 125C**	**Operation Temperature: -40C to 85C**
PE: Zhu Hairong-B21079	**PE: Zhou Ning-B35065**	**PE: Cheng L.Y.-R36716**
Quartz# 226271	**Quartz# 226285**	**Quartz# 226325**
HAST: 3.6V	**HAST: 5.5V**	**HAST: 3.8V**
Lot A: YZME008PY700	**Lot A: YZME008P0G00**	**Lot C: YZME008PED00**
Test Site: FSL-TJN-FM	**Test Site: FSL-TJN-FM**	**Test Site: KESC**

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	Minimum Sample Size	# of Lots	Total Units including spares	Results Lot ID-(#Rej/SS) NA=Not Applicable	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	All surface mount devices prior to HAST, UHST, TC as required per test conditions.			Lot A: 0/231	All surface mount devices prior to HAST, UHST, TC as required per test conditions.			Lot B: 0/231	All surface mount devices prior to HAST, UHST, TC as required per test conditions.			Lot C: 0/231	
HAST	JESD22-A101 A110	**Highly Accelerated Stress Test (HAST):** PC before HAST (for SMDs only): Required HAST = 110°C/85%RH for 264 hrs, Bias = Max Vdd	TEST @ RH	77	1	77	Lot A: 0/77	77	1	77	Lot B: 0/77	77	1	77	Lot C: 0/77	
UHST	JESD22-A102 A118	Unbiased HAST (UHST); PC before UHST (for SMDs only): Required UHST = 110°C/85%RH for 264hrs *Timed RO of 48hrs. MAX*	TEST @ R	77	1	77	Lot A: 0/77	77	1	77	Lot B: 0/77	77	1	77	Lot C: 0/77	
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	1	77	Lot A: 0/77	77	1	77	Lot B: 0/77	77	1	77	Lot C: 0/77	
HTSL	JESD22-A103	**High Temperature Storage Life (HTSL):** 175°C for 504hrs *Timed RO = 96hrs. MAX*	TEST @ RH	77	1	77	Lot A: 0/77	77	1	77	Lot B: 0/77	77	1	77	Lot C: 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	Minimum Sample Size	# of Lots	Total Units including spares	Results Lot ID-(#Rej/SS) NA=Not Applicable	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 1008 hrs Bias = Max Vdd (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 of 96 hrs MAX*	TEST @ RHC	77	0	0	not required	77	0	0	not required	77	0	0	not required	Generic data: Q224015, MA8 24QFN 4x4: 0/80@125 for 1008Hrs Q225771, KEA8(TSMC10, N40J) 24QFN 4x4: 0/80@125C for 1008Hrs
ELFR	AEC Q100-008	**Early Life Failure Rate (ELFR):** AEC Ta = 125°C for 48 hrs Bias = Max Vdd *Timed RO of 48 hrs MAX*	TEST @ RH	800	0	0	not required	800	0	0	not required	800	0	0	not required	Generic data: Q224015, MA8 24QFN 4x4: 0/614 Q225771, KEA8(TSMC10, N40J) 24QFN 4x4: 0/803
EDR	AEC Q100-005	NVM Endurance, Data Retention, and Operational Life (EDR); (also known as NVM Endurance Preconditioning) *Timed RO of 96hrs. MAX*	TEST @ RHC	77	0	0	not required	77	0	0	not required	77	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	Minimum Sample Size	# of Lots	Total Units including spares	Results Lot ID-(#Rej/SS) NA=Not Applicable	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	1	5	Lot A: 0/5, Cpk>1.67	30 bonds	1	5	Lot B: 0/5, Cpk>1.67	30 bonds	1	5	Lot C: 0/5, Cpk>1.67	
WBP	MilStd883-2011	**Wire Bond Pull (WBP):** Cond. C or D	Cpk = or > 1.67	30 bonds from minimum 5 units	1	5	Lot A: 0/5, Cpk>1.67	30 bonds from minimum 5 units	1	5	Lot B: 0/5, Cpk>1.67	30 bonds from minimum 5 units	1	5	Lot C: 0/5, Cpk>1.67	
SD	JESD22-B102	**Solderability (SD):** 8hr.(1 hr. for Au-plated leads) Steam age prior to test.	>95% lead coverage of critical areas	15	1	15	Lot A: 0/15	15	1	15	Lot B: 0/15	15				
PD	JESD22-B100	**Physical Dimensions(PD):** PD per FSL 98A drawing	Cpk = or > 1.67	10	1	30	Lot A: 0/30, Cpk>1.67	10	1	30	Lot B: 0/30, Cpk>1.67	10				
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: pass BOM: approve				DIM: pass BOM: approve				DIM: pass BOM: approve	
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 220°C reflow cycles before shear.	Cpk = or >1.67	10 (5 balls from a min. of 10 devices)	0	0	not applicable	10 (5 balls from a min. of 10 devices)	0	0	not applicable	10 (5 balls from a min. of 10 devices)	0	0	not applicable	
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 applicable	5 (10 leads from each of 5 parts)	0	0	not applicable	5 (10 leads from each of 5 parts)	0	0	not applicable	

Objective: **QFN Cu wire and E-Type Lead Frame Qual in FSL-TJN-FM**

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	Minimum Sample Size	# of Lots	Total Units including spares	Results Lot ID-(#Rej/SS) NA=Not Applicable	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	completed	All	All	All	completed	All	All	All	completed	This action refers to Final Testing of all qualification units.
HBM	AEC-Q100-002 / JESD22	**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	0	0	not required	3 units per Voltage level	0	0	not required	3 units per Voltage level	0	0	not required	
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	0	0	not required	3 units per Voltage level	0	0	not required	3 units per Voltage level	0	0	not required	
CDM	AEC-Q100-011 or JESD22	**ElectroStatic Discharge/ Charged Device Model Classification (CDM):** Test @ 250/500/750 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	9	Lot A: 0/3@250V 0/3@500V 0/3@750C(CP)	3 units per Voltage level	1	9	Lot B: 0/3@250V 0/3@500V 0/3@750C(CP)	3 units per Voltage level	1	9	Lot C: 0/3@250V 0/3@500V 0/3@750V(CP)	
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	0	0	not required	6	0	0	not required	6	0	0	not required	
ED	AEC-Q100-009, Freescale 48A spec	**Electrical Distribution (ED)**	TEST @ RHC For AEC, Cpk = or > 1.67	5	1	5	Lot A: pass	1	0	0		5	1	5	Lot C: pass	
FG	For AEC, AEC-Q100-007	**Fault Grading (FG)**	FG shall be = or > 90% for qual units				FG%= no change				FG%= no change				FG%= no change	
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													

Generic data

Quartuf	Fab/Mask Set/Tech	Product-Qual Description/Part Number (s)	Die Area	Assembly Site	Pkg Description/Code	Mold Description	EPOXY Description	Wire Description	CAB
225771	TSMC10/0N40J/E018AFX5	S9KEAZNB(KEA8) NPI Qual	2.150X2.107	FSL-TJN-FM	QFN MAP 24 4*4*1 P0.5/00CU	CEL-9220HF13	QMI519	25um bare Cu	13372319M
224015	TSMC10/0N40J/E018AFX5	MKE04Z8(MA8) NPI Qual	2.150X2.107	FSL-TJN-FM	QFN MAP 24 4*4*1 P0.5/00CU	CEL-9220HF13	QMI519	25um bare Cu	13100517M

BOM and covered parts list

Logic Part	Package Description/Code	Mask set	FAB	Wafer Tech	ORE SIZE(mmxmm)	Assembly Site	MOLD COMPOUND	Epoxy	Wire Description
MC9S08GT60A	QFN 48 EP 7SQ*1.0P0.5	N22A	TSMCFAB3	E025FX0XQ	3.000X3.070	FSL-TJN-FM	HITACH CEL9220HF13	QMI519	23um bare Cu
MC9S08AC60	QFN 48 EP 7SQ*1.0P0.5	N34A	TSMCFAB3	E025FX0XQ	2.840X2.810	FSL-TJN-FM	HITACH CEL9220HF13	QMI519	23um bare Cu
MC9S08JS16	QFN 24 EP 5*5*1.0P0.65	M77P	TSMCFAB3	E025FX0XQ	2.430X2.420	FSL-TJN-FM	HITACH CEL9220HF13	QMI519	23um bare Cu
MC9S08RE16CFDE	QFN 48 EP 7SQ*1.0P0.5	L78P	TSMCFAB3	E025FX0XQ	2.433X2.433	FSL-TJN-FM	HITACH CEL9220HF13	QMI519	23um bare Cu
MC9S08LL16	QFN 48 EP 7SQ*1.0P0.5	N21A	TSMCFAB3	E025FX0XQ	2.470X2.670	FSL-TJN-FM	HITACH CEL9220HF13	QMI519	23um bare Cu
MC9S08AC16	QFN 48 EP 7SQ*1.0P0.5	N50A	TSMCFAB3	E025FX0XQ	2.624X2.624	FSL-TJN-FM	HITACH CEL9220HF13	QMI519	23um bare Cu
MC9S08AW60	QFN 48 EP 7SQ*1.0P0.5	N30A	TSMCFAB3	E025FX0XQ	2.850X2.820	FSL-TJN-FM	HITACH CEL9220HF13	QMI519	23um bare Cu
MC9RS08KA2	QFN-D 6EP 3SQ0.875P0.95	M44C	TSMCFAB3	E025AFN0	0.998X1.794	FSL-TJN-FM	HITACH CEL9220HF13	QMI519	23um bare Cu
MC9RS08KB12	QFN 24 EP 4SQ*0.65 P0.5	M29W	TSMCFAB3	E025AFN0	1.552X2.316	FSL-TJN-FM	HITACH CEL9220HF13	QMI519	23um bare Cu
MC9RS08KB12	QFN-D 8EP 4SQ*1.0P0.8	M29W	TSMCFAB3	E025AFN0	1.552X2.316	FSL-TJN-FM	HITACH CEL9220HF13	QMI519	23um bare Cu
MC9RS08LA8	QFN-EP 48 7.0SQ*1.0P0.5	M62M	TSMCFAB3	E025AFN0	1.940X1.940	FSL-TJN-FM	HITACH CEL9220HF13	QMI519	23um bare Cu
MCHC908JW32	QFN 48 EP 7SQ*1.0P0.5	L41Y	TSMCFAB3	E025FX0XT	3.637X2.311	FSL-TJN-FM	HITACH CEL9220HF13	QMI519	23um bare Cu
MC9S12Q128	QFN 48 EP 7SQ*1.0P0.5	M72P	FSL-CHD-FAB	E025FX0XQ	4.382X4.382	FSL-TJN-FM	HITACH CEL9220HF13	QMI519	23um bare Cu
MC9S08QG8	QFN 24 EP 4SQ*1.0P0.5	M77B	FSL-CHD-FAB	E025FX0XQ	2.008X1.998	FSL-TJN-FM	HITACH CEL9220HF13	QMI519	23um bare Cu
MC9S08QG8	QFN 16 EP 5SQ*1.0P0.8	M77B	FSL-CHD-FAB	E025FX0XQ	2.008X1.998	FSL-TJN-FM	HITACH CEL9220HF13	QMI519	23um bare Cu
MC9S08QG8	QFN-D 8EP 4SQ*1.0P0.8	M77B	FSL-CHD-FAB	E025FX0XQ	2.008X1.998	FSL-TJN-FM	HITACH CEL9220HF13	QMI519	23um bare Cu
MC9S08QB8	QFN 24 EP 5*5*1.0P0.65	M80N	FSL-CHD-FAB	E025FX0XQ	1.902X2.202	FSL-TJN-FM	HITACH CEL9220HF13	QMI519	23um bare Cu
MC9S08QE8	QFN 32 4*4*1 P0.5	M40J	FSL-CHD-FAB	E025FX0XQ	1.962X2.692	FSL-TJN-FM	HITACH CEL9220HF13	QMI519	23um bare Cu
MC9S08GT16A	QFN 48 EP 7SQ*1.0P0.5	M70C	FSL-CHD-FAB	E025FX0XQ	2.322X2.878	FSL-TJN-FM	HITACH CEL9220HF13	QMI519	23um bare Cu
MC9S08GT16A	QFN 32 EP 5SQ*1.0P0.5	M70C	FSL-CHD-FAB	E025FX0XQ	2.322X2.878	FSL-TJN-FM	HITACH CEL9220HF13	QMI519	23um bare Cu
MC9S08RE16	QFN 48 EP 7SQ*1.0P0.5	M21A	FSL-CHD-FAB	E025FX0XQ	2.433X2.433	FSL-TJN-FM	HITACH CEL9220HF13	QMI519	23um bare Cu
MC9S08LL16	QFN 48 EP 7SQ*1.0P0.5	M60K	FSL-CHD-FAB	E025FX0XQ	2.470X2.670	FSL-TJN-FM	HITACH CEL9220HF13	QMI519	23um bare Cu
MC9S08AC16	QFN 48 EP 7SQ*1.0P0.5	N49A	FSL-CHD-FAB	E025FX0XQ	2.624X2.624	FSL-TJN-FM	HITACH CEL9220HF13	QMI519	23um bare Cu
MC9S08QE32	QFN 48 EP 7SQ*1.0P0.5	M46M	FSL-CHD-FAB	E025FX0XQ	2.793X2.653	FSL-TJN-FM	HITACH CEL9220HF13	QMI519	23um bare Cu
MC9S08AC60	QFN 48 EP 7SQ*1.0P0.5	M58Y	FSL-CHD-FAB	E025FX0XQ	2.842X2.872	FSL-TJN-FM	HITACH CEL9220HF13	QMI519	23um bare Cu
MC9S08AW60	QFN 48 EP 7SQ*1.0P0.5	M75B	FSL-CHD-FAB	E025FX0XQ	2.850X2.820	FSL-TJN-FM	HITACH CEL9220HF13	QMI519	23um bare Cu
MC9S08GT60A	QFN 48 EP 7SQ*1.0P0.5	L11Y	FSL-CHD-FAB	E025FX0XQ	3.080X3.150	FSL-TJN-FM	HITACH CEL9220HF13	QMI519	23um bare Cu
MC9S08JM16	QFN 48 EP 7SQ*1.0P0.5	M61J	FSL-CHD-FAB	E025FX0XQ	3.470X2.720	FSL-TJN-FM	HITACH CEL9220HF13	QMI519	23um bare Cu
MC9S08JM60	QFN 48 EP 7SQ*1.0P0.5	M36H	FSL-CHD-FAB	E025FX0XQ	3.474X3.084	FSL-TJN-FM	HITACH CEL9220HF13	QMI519	23um bare Cu
MC9S08QE128	QFN 48 EP 7SQ*1.0P0.5	M11J	FSL-CHD-FAB	E025FX0XQ	3.600X3.774	FSL-TJN-FM	HITACH CEL9220HF13	QMI519	23um bare Cu
MC9S08AC128	QFN 48 EP 7SQ*1.0P0.5	M72Y	FSL-CHD-FAB	E025FX0XQ	3.615X3.427	FSL-TJN-FM	HITACH CEL9220HF13	QMI519	23um bare Cu
MC9S08QE32	QFN32EP 5SQ*1.0P0.5	M46M	FSL-CHD-FAB	E025FX0XQ	2.793X2.653	FSL-TJN-FM	HITACH CEL9220HF13	QMI519	23um bare Cu
MC9S08SH8	QFN 24 EP 4SQ*1.0P0.5	M84G	FSL-CHD-FAB	E025FX0XQ	2.072X2.322	FSL-TJN-FM	HITACH CEL9220HF13	QMI519	23um bare Cu

Revision	Date	Comments	Author
Rev. A	Jun 30-2014	Update qual result	Nancy Long