

Commercial & Industrial Qualification Report Summary

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|---|----------------------------------|--|--|---|----------------------------------|----------------------------------|-----------------|---------|--|--|
| Objective: Kirin2E 4th Revision for ADC drop and Hitch problem | | | | | | | | | | |
| Freescale PN: MCF52235CAL60 Part Name: Kirin 2E | | Customer Name(s): Various PN(s): Various | | Plan or Results: Revision # & Date: See Revision History in Notes) | | | | | | |
| Technology: 0.25um SGF Package: LQFP 112 20*20*1.4P0.65 (8255) | | Design Engr: Phone #: Bishnoi Navin-B12218 | | QUARTZ Tracking #: 212944 | | | | | | |
| Fab / Assembly / Final Test Sites: TSMC11/KLM/KLM | | Product Engr: Ad Azhar Muslim-B36772 Phone #: 03-78732507 | | (Signature/Date shown below may be electronic) | | | | | | |
| Maskset#: M23E Rev#: 4 | | Prod. Package Engr: Phone #: not applicable | | PPE Approval (for DIM/BOM results) Signature & Date: not applicable, no change to BOM | | | | | | |
| Die Size (in mm) W x L x T 7.150 x 6.940 mm | | NPI PRQE: Miza Ismail - r27786 / Nurazah Ahmad-R63712 Phone #: 603 78732723 | | Miza Ismail - r27786 / Nurazah-R63712 NPI PRQE Approval Signature & Date: 3 Feb 2012 | | | | | | |
| Part Operating Temp. Grade: Grade 3 -40°C to +85°C | | <table border="1" style="width: 100%; border-collapse: collapse; font-size: x-small;"> <tr> <td style="text-align: center;">LOT A WEMHA1DR3R0 0</td> <td style="text-align: center;">LOT B WEMHA1DR3U00 QAD1112</td> <td style="text-align: center;">LOT C WEMHA1DR3T00 QAC1112</td> </tr> <tr> <td>Trace/DateCode:</td> <td>QAA1112</td> <td></td> </tr> </table> | | LOT A WEMHA1DR3R0 0 | LOT B WEMHA1DR3U00 QAD1112 | LOT C WEMHA1DR3T00 QAC1112 | Trace/DateCode: | QAA1112 | | CAB Approval 10181374M Signature & Date: 3 Feb 2012 |
| LOT A WEMHA1DR3R0 0 | LOT B WEMHA1DR3U00 QAD1112 | LOT C WEMHA1DR3T00 QAC1112 | | | | | | | | |
| Trace/DateCode: | QAA1112 | | | | | | | | | |
| | | | | Customer Approval Signature & Date: not required | | | | | | |

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

TESTS HIGHLIGHTED IN YELLOW WILL BE PERFORMED FOR THIS STUDY

This preliminary qual plan is provided for planning purposes only and may be modified until Freescale CAB and customer approved.

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

| GROUP A - ACCELERATED ENVIRONMENTAL STRESS TESTS | | | | | | | |
|--|------------------------------------|--|------------------------------|---|------------------------------|--|---|
| Stress Test | Reference | 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 | TEST @ RH | All surface mount devices prior to THB, HAST, AC, UHST, TC, PC+PTC and as required per test conditions. | | pass | |
| 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 = Vddmax Timed RO of 48hrs. MAX | TEST @ RH | 77 | 0 | 0 | pass 2M23E/112 LQFP 0/100 (Lot A*: Quartz 48537-42 (limited test)) 2M23E/112LQFP 0/100 (Lot A*: Quartz 48537-43 (std test flow)) 1M23E/112LQFP 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 | not applicable not required |
| 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. WBP after TC on 5 devices from 1 lot; 2 bonds per corner and one mid-bond per side on each device. Record which pins were used. | TEST @ RHC WBP => 3 grams | 77 | 0 | 0 | pass 1M23E/112LQFP 0/77 Generic 112LQFP Data: 0/231 1M23E/80LQFP 0/231 1M23E/121MAPBGA 0/308 |
| HTSL | JESD22-A103 | High Temperature Storage Life (HTSL) : 150°C for 1008 hrs CKBD condition prior to HTSL Timed RO = 96hrs. MAX | TEST @ RHC | 77 | 0 | 0 | pass 1M23E/112LQFP 0/77 @ 504hrs/175C 1M23E/80LQFP 0/45 @ 1008h/150C 1M23E/80LQFP 0/45 @ 504h/175C (FY1) 1M23E/121MAPBGA 0/154 @ 1008h/150C |

| TEST GROUP B - ACCELERATED LIFETIME SIMULATION 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) |
| HTOL (Vcore) | JESD22-A108 | High Temperature Operating Life (HTOL): Ta = 125°C for 168hrs Bias =3.3V(Core) 10k W/E at 85C required prior to HTOL | TEST @ RHC | 77 | 3 | 231 | Lot A- 0/77 Lot B - 0/77 Lot C- 0/77 | |
| HTOL (Vio) | JESD22-A108 | High Temperature Operating Life (HTOL): Ta = 125°C for 168hrs (Bias =3.8V (IO) 10k W/E at 85C required prior to HTOL | TEST @ RHC | 77 | 3 | 231 | Lot A- 0/77 Lot B - 0/77 Lot C- 0/77 | |
| ELFR | AEC Q100-008 | Early Life Failure Rate (ELFR): Ta = 125°C for 48 hrs; Bias : Core = 3.3V <i>Timed RO of 48 hrs MAX</i> | TEST @ RHC | 800 | 0 | 0 | pass | 1M23E/112LQFP 0/1155 * MiM Fails. Prior to MiM screen. 1M23E/112LQFP 0/900 with MiM screen. MCF52110(Kirin0, M44G) Q73527 - 0/800 @ 48hrs MCF52221(Kirin2u, M24E) Q62036 - 0/811 @ 48hrs |
| EDR | AEC Q100-005 | NVM Endurance, Data Retention, and Operational Life (EDR): DRB : 150C @ 168hrs <i>Timed RO of 48hrs. MAX</i> | TEST @ RHC | 77 | 0 | 0 | pass | 1M23E/112LQFP 0/77 @ 504hrs/175C 1M23E/80LQFP 0/45 @ 1008h/150C 1M23E/80LQFP 0/45 @ 504h/175C (FYI) 1M23E/121MAPBGA 0/154 @ 1008h/150C |
| TEST GROUP C - PACKAGE ASSEMBLY INTEGRITY 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) |
| WBS | AEC Q100-001 | Wire Bond shear (WBS) | Cpk = or > 1.67 | 30 bonds from minimum 5 units | 0 | 0 | not applicable | 1M23E/112LQFP 0/6, Cpk = 2.17 1M23E/80LQFP 0/6, Cpk = 4.24 1M23E/121MAPBGA 0/6, Cpk = 5.68 |
| WBP | MilStd883-2011 | Wire Bond Pull (WBP): Cond. C or D | Cpk = or > 1.67 | 30 bonds from minimum 5 units | 0 | 0 | not applicable | 1M23E/112LQFP 0/6, Cpk = 4.22 1M23E/80LQFP 0/6, Cpk = 3.84 1M23E/121MAPBGA 0/6, Cpk = 2.59 |
| 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 applicable | 1M23E/112LQFP 0/15 1M23E/80LQFP 0/15 |
| PD | JESD22-B100 | Physical Dimensions(PD): PD per FSL 98A drawing | Cpk = or > 1.67 | 30 | 0 | 0 | not applicable | 1M23E/112LQFP 0/30, All Cpks > 1.67 1M23E/80LQFP 0/30, All Cpks > 1.67 |

| TEST GROUP E - ELECTRICAL VERIFICATION 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) |
| HBM | JEDEC METHOD (AEC NOT REQ'D) | ElectroStatic Discharge/ Human Body Model Classification (HBM): Test @ 500/1000/1500/2000 Volts See AEC-Q100-002 for classification levels. | TEST @ RH 2KV min. | 3 units per Voltage level | 1 | 12 | WEMHA1DR3R00 0/3 @ 500V 0/3 @ 1000V 0/3 @ 1500V ^{Note 1} 3/3 @ 2000V ^{Note 2} | Note 1: Unit go through substitute method as allowed by AEC Q100G. Note 2: Equivalent result with 3M23E Refer datasheet for details. |
| MM | AEC-Q100-003 | ElectroStatic Discharge/ Machine Model Classification m(MM): Test @ 50/100/200 Volts See AEC-Q100-003 for classification levels. | TEST @ RH 200V min. | 3 units per Voltage level | 0 | 0 | | not required |
| CDM | JEDEC METHOD (AEC NOT REQ'D) | ElectroStatic Discharge/ Charged Device Model Classification (CDM): Test @ 250/500/750cp Volts See AEC-Q100-011 for classification levels. Timed RO of 96hrs MAX. | TEST @ RH Corner pins => 750V; All other pins => 500V | 3 units per Voltage level | 1 | 9 | Lot A : 250V: 0/3 500V: 0/3 750V: 0/3 | |
| LU | JESD78 plus AEC-Q100-004 | Latch-up (LU): Test per JEDEC JESD78 with the AEC-Q100-004 requirements. Ta= Maximum operating temperature Vsupply = Maximum operating voltage | TEST @ RH | 6 | 1 | 6 | Lot A - 0/6 | |
| ED (Vcore) | AEC-Q100-009, Freescale 48A spec | Electrical Distribution (ED) pre and post 168hrs HTOL | TEST @ RHC | 30 | 3 | 90 | Pass | |
| FG | AEC-Q100-007 | Fault Grading (FG) | FG shall be = or > 90% for qual units | | | | | not required |
| GL | AEC-Q100-006 | Electro-Thermally Induced Gate Leakage (GL): 155°C, 2.0 min, +400/-400 V Timed RO of 96 hrs MAX. <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 |
| 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 <u>150kHz - 1GHz</u> | 1 | 0 | 0 | | not required |

Qualification Material :

| Part Number | Moo Number | Die Size, Process Technology | Quartz | Wafer Fab/ Polyimide | Die Attach | Mold Compound | Leadfram Flgsize | Wire |
|-------------|------------|------------------------------|--------|----------------------|------------|----------------|------------------|----------|
| Kirin 2E | M23E | 7.150 x 6.940 mm , E025AFXQ | 212944 | TSMC11/ 8124 | CRM 1525 | SUMITOMO G760L | Substrate 12x12 | 0.98mils |

Revision history

| Revision | Date | Comment | Author |
|----------|----------|----------------------------|---------------|
| 1.0 | 1-Mar-12 | Final Qualification Report | Nurazah Ahmad |