9S12C128 Freescale Tianjin China (TJNFM) BurnIn Qualification Report

1. Introduction:

This report details the burn-in correlation plan and result of 9S12C128 so that Freescale Tianjin China (TJNFM) can burn-in the same production line as in the Trio Tech Malaysia (TTM) and KESM Malaysia (KESM) site. These correlation units were first processed at the TJNFM test site and then processed in TTM, with the ambient burn-in temperature at 125°C.

Koi
Mask set: 0M66G/2L09S;
Production line:
G9FSC28A/G9FSC96A/G9FSC64A/G9FSC28B/G9FSC96B/G9FSC64B/S9FSC28A/S9FSC96A/S9FSC64A/S9FSC28B/S9FSC96B/S9FSC64B
Package code: 6089/8260;

TTM
Hardware:

Burn-in System	:	IBE
Burn-in Pattern Generator	:	Flash Memory
Burn-in Driver	:	CC1
Burn-in Program Software:	:	MBI 6.5.0
Environment Plan	:	125C
Burn-in Program(s)	:	9S12C128-TSMC-A6_1 / 9SC128-ATMC-B3

TJNFM
Hardware:

Burn-in System	:	IBE
Burn-in Pattern Generator	:	Flash Memory
Burn-in Driver	:	CC1
Burn-in Program Software	:	MBI 6.5.0
Environment Plan	:	125C
Burn-in Program(s)	:	9S12C128-TSMC-A6_1 / 9SC128-ATMC-B3

Conclusion: Same hardware and software environment were used in both TTM and TJNFM.

- Correlation Lot Information:

BI&FTSite	Final Test Lot #	Device Part ID	Mask/Rev	Wafer lot	Package Descr.	Start Qty
TJN	YZME0041R400	SC102302MFA	TSMC (2L09S)	PC90124900	LQFP 48 7*7*1.4P0.5	1027
TJN	YZME004D8S00	MC9S12GC128MPBE	TSMC (2L09S)	T1PC90463400	LQFP 52 10*10*1.4P0.65	1000
TJN	YZME004D8T00	MC9S12GC128MPBE	TSMC (2L09S)	T1PC90463500	LQFP 52 10*10*1.4P0.65	1000
TJN	YZME004E6B00	MC9S12C128MFAE	ATMC (0M66G)	DD682641	LQFP 48 7*7*1.4P0.5	1000
TJN	YZME0041JL00	MC9S12GC128MPBE	ATMC (0M66G)	DD647341	LQFP 52 10*10*1.4P0.65	1000
TJN	YZME0041JM00	MC9S12GC128MPBE	ATMC (0M66G)	DD647341	LQFP 52 10*10*1.4P0.65	1000
TTM	YZME0041R401	SC102302MFA	TSMC (2L09S)	PC90124900	LQFP 48 7*7*1.4P0.5	1027
TTM	YZME004D8S01	MC9S12GC128MPBE	TSMC (2L09S)	T1PC90463400	LQFP 52 10*10*1.4P0.65	1000
TTM	YZME004D8T01	MC9S12GC128MPBE	TSMC (2L09S)	T1PC90463500	LQFP 52 10*10*1.4P0.65	1000
TTM	YZME004E6B01	MC9S12C128MFAE	ATMC (0M66G)	DD682641	LQFP 48 7*7*1.4P0.5	1000
TTM	YZME0041JL01	MC9S12GC128MPBE	ATMC (0M66G)	DD647341	LQFP 52 10*10*1.4P0.65	1000
TTM	YZME0041JM01	MC9S12GC128MPBE	ATMC (0M66G)	DD647341	LQFP 52 10*10*1.4P0.65	1000

2. Engineering Qualification Plan:

2.1. Requirements:
The requirements and acceptance criteria were based off of agreements between MCD Reliability and MCD Product Engineering. If a specification exists for this transfer/change, then the specification overrides these requirements.

Name	Detail Description	Req'd per Correlation Plan (Y / N?)	Acceptance Criteria	Comment
Pattern Verify	**Goal:** Correlate and verify correct functionality of burn-in patterns, cycling, etc **Lot quantity:** 1 lot for each maskset (2L09S,0M66G) **Units per lot:** Full board (78 pcs) for each maskset **Temperature:** 125C **BI Duration:** 12hours and 10 minutes **Type of units:** good **Site:** TTM, TJN	**Y**	**Correct pattern written to array or other product module(s)**	Perform 1 full board units checkout. The checkout result must be correlated with status dump or PBIT result.
Equipment Release	**Goal:** Calibration and verification of entire system according to site standard equipment release procedure (May include performing voltage calibration on all drivers including debug station, meet GR&R requirements, etc.) **Lot quantity / Units per lot:** 0 **Temperature:** BI Ta **BI Duration:** N/A **Type of units:** N/A **Site:** TJN	**Y**	**Approval by manufacturing CAB**	N/A
Package Case Temperature	**Goal:** Compare temperature at surface of mold compound or on-chip temperature monitor **Lot quantity:** 1 **Units per lot:** Full Board **Temperature:** BI Ta	**Y**	**Less than 15% variation or to be agreed by PE/TE and R&QA**	Thermocouples on five units with full burn-in board running stress pattern. For high power devices, also verify with single part on board to ensure no

	BI Duration: N/A **Type of units:** good **Site:** TJN			overheating.
Ambient Temperature	**Goal:** Compare temperate of air inside chamber **Lot quantity:** 1 **Units per lot:** Full Board **Temperature:** BI Ta **Type of units:** good **BI Duration:** N/A **Site:** TJN	**Optional**	**Less than 10% variation or to be agreed by PE/TE and R&QA.**	One thermocouple. Can be performed along with Package Case Temperature.
Burn-in Board Voltages	**Lot quantity / Units per lot:** 0 **Temperature:** BI Ta **BI Duration:** N/A **Type of units:** N/A **Type of units:** good **Site:** TJN	**Y**	**Voltage within range of target to be agreed by PE/TE and R&QA**	Measure at front & back of empty and full burn-in board.
Burn-in Board Current	**Goal:** Compare burn-in board current **Lot quantity:** 1 **Units per lot:** Full board (78 pcs) **Temperature:** BI Ta **BI Duration:** N/A **Type of units:** good **Site:** TTM, TJN	**Y**	**Less than 15% variation or to be agreed by PE/TE and R&QA.**	Best measured on individual devices. Or measure entire full board current minus empty board current divided by # of devices on full board.
Three Lot Burn-in Check	**Goal:** Verify that burn-in system does not cause abnormal non-burn-in failures **Lot quantity:** 3 lots for each maskset(2L09S,0M66G) **Units per lot:** 1000 **Temperature:** BI Ta **BI Duration:** Typical BI Duration **Type of units:** good **Site:** TJN	**Y**	**Address manufacturability / over-stress issues.**	Run through standard test flow.

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Burn-in Yield	**Goal:** Verify that burn-in system does not cause unusually low yield **Lot quantity:** 1 lot for each maskset(2L09S,0M66G) **Units per lot:** 1000 **Temperature:** BI Ta **BI Duration:** Typical BI Duration **Type of units:** good **Site:** TTM, TJN	**Y**	**Post BI yield within PDA limit or agreed up by PE/TE and R&QA.**	The yield of TJN should be equal or better than TTM.
Visual Inspection	**Goal:** Check for visual mechanical **Lot quantity:**1 lot for each maskset(2L09S,0M66G) **Units per lot:** 500 **Temperature:** 25C **BI Duration:** N/A **Type of units:** good **Site:** TTM, TJN	**Y**	**Less than 2% variation or agreed upon by PE/TE and R&QA.**	Use the same units from Burn-in Yield check in BI correlation. (the microscope 10x is utilized for manually inspection)
Solderability Test	**Goal:** Check for solderability on the leads **Lot quantity:** 1 lot for each package **Units per lot:** 20 **Type of units:** good **Site:** TJN	**Y**	**As per 12MRM27364A**	

3. Correlation/Qualification Results:

3.1. Pattern Verify:

Table 1 summarizes the pattern comparison results.

Table 1.

BI site	Lot Number	Maskset	BI Program	BIB And Raw Stock Quantity	Result
TTM	YZME0041R401	TSMC (2L09S)	9S12C128-TSMC-A6_1	1 Full Board with 78pcs raw stock	Pass
TTM	YZME004E6B01	ATMC (0M66G)	9SC128-ATMC-B3	1 Full Board with 78pcs raw stock	Pass
TJN	YZME0041R400	TSMC (2L09S)	9S12C128-TSMC-A6_1	1 Full Board with 78pcs raw stock	Pass
TJN	YZME004E6B00	ATMC (0M66G)	9SC128-ATMC-B3	1 Full Board with 78pcs raw stock	Pass

Conclusion: Passed requirement.

3.2. Equipment Release: (TJNFM equipment Buy-off and release stuff)

3.3. Burn-in Board Voltage Measurements:

Tables 2 summarize the voltage measurements taken from an empty and full burn-in board.

Table 2. Burn-in Board Voltage Measurements at 125C

BIB Condition	BIB Location	Target (V)	TJNFM (V)	Delta from Target (V)
Empty	VDUT1(V1)	6	6.03	0.03
	VDUT2(V2)	0	0	0
Full	VDUT1(V1)	6	5.98	-0.02
	VDUT2(V2)	0	0	0

Conclusion: Passed requirement.

3.4. Package Case Temperature:

Table 3 shows the temperature of five chip packages run in a full burn-in board under normal burn-in conditions. At the time of the measurement, the oven temperature had stabilized for 30 minutes and pattern was being executed. The thermocouples were located in all four corner sockets and one socket at the center of the burn-in board (see Figure 2). The thermocouples were epoxied to the top of the device.

Figure 1. Location of Thermocouples

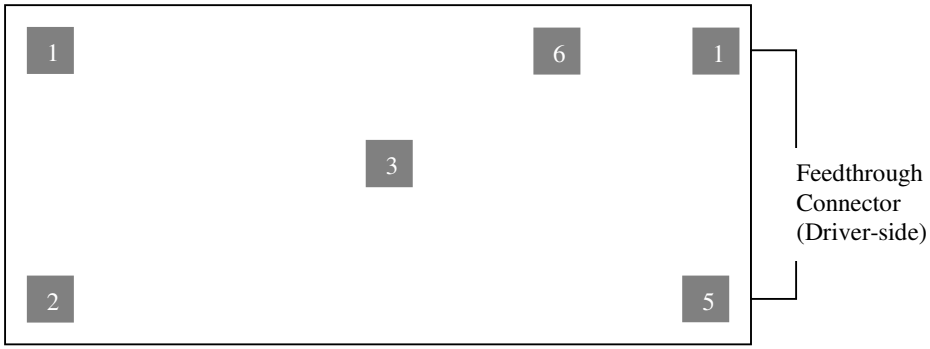


Table 3. Case Temperatures

Thermocouple #	Thermocouple Location	Target (C)	TJNFM (C)	% Delta
1	**Upper Left Corner**	125	126	0%
2	**Lower Left Corner**	125	126	0.8%
3	**Center of BIB**	125	125	0%
4	**Lower Right Corner**	125	125	0%
5	**Upper Right Corner**	125	125	0%

Conclusion: Passed requirement.

3.5. Ambient Temperature:
Table 4 shows the ambient air temperature in the chamber while the burn-in system is running under normal operating conditions at BI Ta.

Table 4. Chamber Air Temperature

Thermocouple #	Thermocouple Location	TJNFM (C)	TTM (C)	Delta (%)
6	**Open Area in Chamber**	28	28	0

Conclusion: Passed requirement.

3.6. Burn-in Board Current:
Table 5 shows the current reading on a full burn-in board running various patterns at BI Ta.

Table 5. Burn-in Board Current

BI Program	# Units on BIB	Time Phase	TTM (mA)	TJN (mA)	% Delta
9SC128-ATMC-B3	78	Burn In start	300	300	0.00%
		Hour1	650	700	7.69%
		Hour2	900	900	0.00%
		Hour3	3450	3450	0.00%
		Hour4	3450	3450	0.00%
		Hour5	3450	3450	0.00%
		Hour6	3450	3450	0.00%
		Hour7	3450	3450	0.00%
		Hour8	3450	3450	0.00%
		Hour9	3450	3450	0.00%
		Hour10	3450	3450	0.00%
		Hour11	3400	3450	1.47%
		Hour12	450	450	0.00%
		Burn In Complete	50	50	0.00%

Conclusion: Passed requirement.

3.7. 3-Lot Burn-in Check:
Table 6 shows the result of the burn-in check.

Table 6. 3-Lot Burn-in Check

BI Site	Lot Number	Maskset	BI Program	Start Qty	Result
TJN	YZME0041R400	TSMC (2L09S)	9S12C128-TSMC-A6_1	1027	Pass
TJN	YZME004D8S00	TSMC (2L09S)	9S12C128-TSMC-A6_1	1000	Pass
TJN	YZME004D8T00	TSMC (2L09S)	9S12C128-TSMC-A6_1	1000	Pass
TJN	YZME0041JL00	ATMC (0M66G)	9SC128-ATMC-B3	1000	Pass
TJN	YZME0041JM00	ATMC (0M66G)	9SC128-ATMC-B3	1000	Pass
TJN	YZME004E6B00	ATMC (0M66G)	9SC128-ATMC-B3	1000	Pass

Conclusion: Passed requirement.

3.8. Burn-in Yield:
Table 7 shows the result of the post burn-in yield.

Table 7. Burn-in Yield

BI Site	Final Test Lot #	Start Qty	BI Yield
TTM	YZME0041R401	1027	99.81%
TJN	YZME0041R400	1027	98.05%
TTM	YZME004E6B01	1000	97.9%
TJN	YZME004E6B00	1000	98%

Conclusion: Transfer site (TJN) has comparable yield with original site (TTM).

3.9 Visual inspection
Table 8 shows the result of the visual inspection post burn-in.

Table 8.Visual Inspection

BI Site	Final Test Lot #	Inspection Qty	Visual Yield
TTM	YZME004D8S01	500	100%
TJN	YZME004D8S00	500	100%
TTM	YZME004E6B01	500	100%
TJN	YZME004E6B00	500	100%

Conclusion: All result showed passed

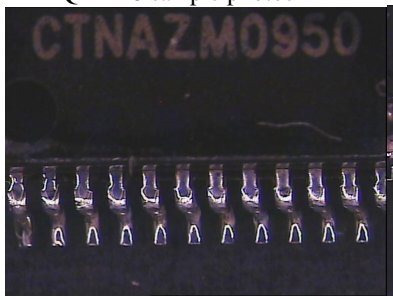
3.10 Solderability Test

Table 9 shoes the result of solderability test post burn-in.

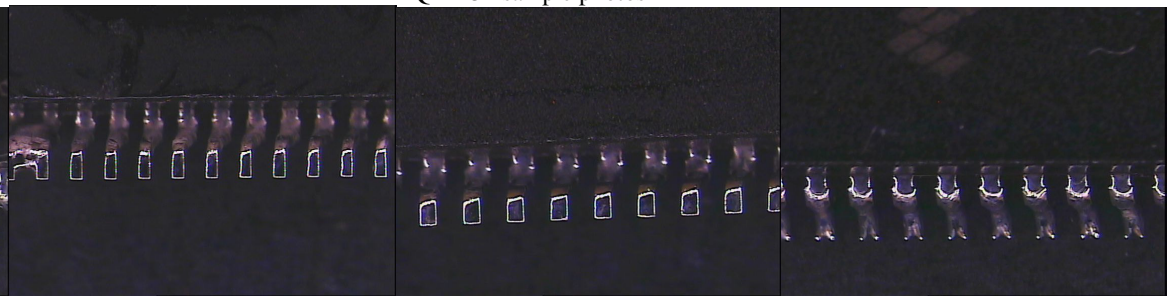
Table 9.Solderability Test

BI Site	Final Test Lot #	Package	Test Qty	Result
TJN	YZME0041R400	LQFP 48 7*7*1.4P0.5	20	Passed
TJN	YZME004D8S00	LQFP 52 10*10*1.4P0.65	20	Passed

LQFP 48 sample photos



LQFP 52 sample photos



Conclusion: All result showed passed

~ End of Report ~