Ind Tier Qual Results

Objective:	**Qualification of the MCF5282 and MCF5216 Device in NXP-CHD Fab**				
NXP PN: Part Name:	MCF5282/5216 MCF5282/5216	Customer Name(s): PN(s):	Varies Varies	Plan or Results: Revision # & Date:	Results See Revisions Below
Technology: Package:	E025FXXQ / 0.25um Technology MAPBGA 256 17*17*1.6P1.0	Design Engr:	Not Applicable	QUARTZ Tracking #:	265933
Fab / Assembly / Final Test Sites:	NXP-CHD / NXP-ATTJ / NXP-ATKL	Product Engr:	Hugh Dong		(Signature/Date shown below may be electronic)
Maskset#: Rev#:	N04K 0	GAO(Global Assembly Operation) Engr:	Y.F WANG	GAO Approval (for DIM/BOM results) Signature & Date:	Y.F WANG 18-Apr-22
Part Operating Temp. Grade:	Ambient: -40 °C to + 85 °C, Max Junction: + 105 °C	NPI PRQE:	Roy ZHANG	NPI PRQE Approval Signature & Date:	Roy ZHANG 22-Apr-22
		Trace/DateCode:	LOTA- 8EME00K8TJ00	LOTB- 8EME00K8TH00	LOTC- 8EME00K8TK00
				CAB Approval Signature & Date:	21281603B 26-Aug-22

TESTS HIGHLIGHTED IN YELLOW ARE PERFORMED FOR THIS STUDY

This testing is performed by NXP Reliability Lab (NXP-ATTJ-Lab) unless otherwise noted in the Comments.

TEST 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	All surface mount devices prior to THB and TC as required per test conditions.			Lot A: 0/77	**Generic Data:** MCF51MM256VML, 2M79V, MAPBGA104 10*10*0.8P0.8, NXP-ATTJ, Q226324: 0/154 MCF52223CVM80, 2M24E, MAPBGA81 10*10*0.8P1.0, NXP-ATTJ, Q226270: 0/77 MCF5223SCVM60, 4M23E, MAPBGA121 12*12*1.6P1.0, NXP-ATTJ, Q226379: 0/154
THB	JESD22-A101	**Temperature-Humidity-Bias (THB):** PC before THB: Required THB = 85°C/85%RH for 1008 hrs Bias = Max Vdd	TEST @ RH	45	0	0	pass	**Generic Data:** MCF51MM256VML, 2M79V, MAPBGA104 10*10*0.8P0.8, NXP-ATTJ, Q226324: 0/77 MCF52223CVM80, 2M24E, MAPBGA81 10*10*0.8P1.0, NXP-ATTJ, Q226270: 0/77 MCF5223SCVM60, 4M23E, MAPBGA121 12*12*1.6P1.0, NXP-ATTJ, Q226379: 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	45	1	77	Lot A: 0/77	**Generic Data:** MCF51MM256VML, 2M79V, MAPBGA104 10*10*0.8P0.8, NXP-ATTJ, Q226324: 0/77 MCF5223SCVM60, 4M23E, MAPBGA121 12*12*1.6P1.0, NXP-ATTJ, Q226379: 0/77
HTSL	JESD22-A103	**High Temperature Storage Life (HTSL):** 150°C for 1008 hrs	TEST @ RH	45	0	0	pass	**Generic Data:** MCF51MM256VML, 2M79V, MAPBGA104 10*10*0.8P0.8, NXP-ATTJ, Q226324: 0/77 MCF52223CVM80, 2M24E, MAPBGA81 10*10*0.8P1.0, NXP-ATTJ, Q226270: 0/77 MCF5282CVM66, 2L95M, MAPBGA256 17*17*1.6P1.0, NXP-ATTJ, Q226326: 0/77 MCF5223SCVM60, 4M23E, MAPBGA121 12*12*1.6P1.0, NXP-ATTJ, Q226379: 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 696hrs, 1000hrs Stress Bias = 3.1V core Devices incorporating NVM shall receive 1X 'NVM endurance preconditioning'(W/E cycling). Test R, C, H after W/E cycling.	TEST @ RCH	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	TEST @ RH	611	0	0	pass	**Generic data:** MCF51AC256, 1M60N, Q124517: 0/2444, 125°C for 72hrs MCF61JM128, 1M92K, Q111820: 0/800, 125°C for 48hrs
EDR	AEC Q100-005	**NVM Endurance, Data Retention, and Operational Life (EDR):** W E @105°C DRB: 150°C for 1008 hrs / 175°C for 504 hrs Devices incorporating NVM shall receive 1X 'NVM endurance preconditioning'(W/E cycling). Test R, C, H after W/E cycling.	TEST @ RCH	77	0	0	pass	**Generic Data:** MCF52255CAF80, N18K, Q233923: Lot A: 0/77 @ 150C for 168hrs MCF51AC256, 1M60N, Q124517: 10k Flash W/E Cycling @ 105°C Lot A: 0/57 @ 175C for 504hrs Lot B: 0/58 @ 175C for 504hrs Lot C: 0/59 @ 175C for 504hrs

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	1	5	Lot A: 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	
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	>95% lead coverage of critical areas	15	0	0	Not required	Fab transfer, no change.
PD	JESD22-B100	**Physical Dimensions(PD):** PD per NXP case outline	Cpk = or > 1.67	10	0	0	Not required	Fab transfer, no change.
DIM & BOM		**Dimensional (DIM):** GAO to verify PD results against valid NXP case outline drawing. **BOM Verification (BOM):** GAO to verify qual lot ERF BOM is accurate.					DIM: pass BOM: appoved	
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	Fab transfer, no change.
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	

NXP PN: Part Name:	MCF5282/5216 MCF5282/5216	Customer Name(s): PN(s):	Varies Varies	Plan or Results: Revision # & Date:	Results See Revisions Below

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.
HCI		**Hot Carrier Injection (HCI)**						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.

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	JS-001	**ElectroStatic Discharge/ Human Body Model Classification (HBM):** Test @ 500/1000/1500/2000 Volts	TEST @ RH 2KV min.	3 units per Voltage level	1	12	Lot A: 0/3@500V 0/3@1000V 0/3@1500V 0/3@2000V	
CDM	JS-002	**ElectroStatic Discharge/ Charged Device Model Classification (CDM):** Test @ 500/750 Volts	TEST @ RH All pins =/> 500V	3 units per Voltage level	1	6	Lot A: 0/3@500V 0/3@750V	
LU	JESD78	**Latch-up (LU):** Test per JEDEC JESD78. Ta= 105 °C Maximum operating temperature Vsupply = Maximum operating voltage +/-100mA	TEST @ RH	6	1	6	Lot A: 0/6	
ED	AEC-Q100-009, NXP spec	**Electrical Distribution (ED)**	TEST @ RCH	30	1	30	Lot A: pass, comparable between TSMC3 and NXP-CHD	Drift within +/-1 sigma or less than +/-15% to spec
FG	For AEC, AEC-Q100-007	**Fault Grading (FG)**	FG shall be = or > 90% for qual units				No change	
CHAR	For AEC, AEC-Q003	**Characterization (CHAR):** Ony performed on new technologies and part families per AEC Q003.						
EMC	IEC 61967-2 - Radiated Emission Measurement (TEM Cell)	Electromagnetic Compatibility (EMC) Test per IEC 61967-2. Ta= Room Temp Vsupply = Typical operating voltage					Not required	

Bill of Material(BOM)

Quartz	Fab/Mask Set/Tech	Product-Qual Description/Part Number (s)	Assembly Site	Pkg Description	Mold Description	EPOXY Description	Wire Description	SD Description
265933	NXP-CHD/ 0N04K / E025FXXQ	Qualification of the MCF5282 and MCF5216 Device in NXP-CHD	NXP-ATTJ	MAPBGA256 17*17*1.6P1.0	SUMITOMO G760L	ABLEBOND 2025D	20um PdCu	SAC387 0.5mm

Pkg qual generic data

Quartz	Fab/Mask Set/Tech	Product-Qual Description/Part Number (s)	Assembly Site	Pkg Description	Mold Description	EPOXY Description	Wire Description	SD Description
226324	NXP-CHD / 2M79V / E025FXXQ	MCF51MM256VML_Cu Wire Qualification	NXP-ATTJ	MAPBGA104 10*10*0.8P0.8	SUMITOMO G760L	ABLEBOND 2025D	20um PdCu	SAC105 0.4mm
226270	NXP-ATMC / 2M24E / E025FXXQ	MCF52223CVM80_Cu Wire Qualification	NXP-ATTJ	MAPBGA81 10*10*0.8P1.0	SUMITOMO G760L	ABLEBOND 2025D	20um PdCu	SAC405 0.4mm
226326	TSMC3 / 2L95M / E025FXXQ	MCF5282CVM66_Cu Wire Qualification	NXP-ATTJ	MAPBGA256 17*17*1.6P1.0	SUMITOMO G760L	ABLEBOND 2025D	20um PdCu	SAC387 0.5mm
226379	TSMC11 / 4M23E / E025FXXQ	MCF52235CVM60_Cu Wire Qualification	NXP-ATTJ	MAPBGA121 12*12*1.6P1.0	SUMITOMO G760L	ABLEBOND 2025D	20um PdCu	SAC405 0.5mm

Die qual generic data

Quartz	Mask Set	Product-Qual Description/Part Number (s)	Technology	Fab	Operation Temp(Ta)
124517	1M60N	MCF51AC256 NPI LQFP80 Qual	E025FMXQ	NXP-CHD	-40 °C to +105 °C
111820	1M92K	MCF61JM128 NPI LQFP80 Qual	E025FMXQ	NXP-CHD	-40 °C to +105 °C
233923	0N18K	MCF52255CAF80 TSMC to CHD fab transfer qual	E025FMXQ	NXP-CHD	-40 °C to +85 °C

Revision	Date	Comments	Author
Rev A	Apr-22nd-2022	Qual report update	Roy Zhang