AEC-Q100H Automotive Tier Qual Result

Objective:	**IMX 31 AUTO_MAPBGA Molding Compound G770SFL Qualification**				
NXP Part #: / Part Name:	MCIMX31Cxx/MCIMX31LCxx / i.MX 31 AUTO	Customer Name(s): / PN#s):	Varies / Varies	Results: / Revision # & Date:	Result / See revision history
Technology: / Package:	EN40LXXT / CMOS90LP / MAPBGA 473 19*19*1.12 P0.8	Design Engr:	NA	QUARTZ Tracking #:	NA
Fab / Assembly / Final Test Sites:	TSMC 12/NXP-ATTJ/NXP-ATTJ	Product Engr:	Cathy Chen	GAO Approval (for DIM/BOM results) Signature & Date:	Jeambo Chen
Maskset#: / Revit:	0M91E	Prod. Pkg Engr:	Jeambo Chen	NPI PRQE Approval Signature & Date:	Diego Liu / 14-Mar-2023
Die Size (in mm) W x L	See C of DC in PPAP	NPI PRQE:	Diego Liu	CAB Approval Signature & Date:	230224009
Part Operating Temp. Grade:	AEC Q100 Grade3: -40°C to +85°C	Trace/DateCode:	N/A	Qualification Description:	Upgrade molding compound from G770FL to G770SFL. The compostion is same, but G770SFL has lower content of alpha filler. There is no changes of molding compound process/ recipe.

TESTS HIGHLIGHTED IN YELLOW WILL BE PERFORMED FOR THIS STUDY

This testing is performed by NXP Reliability Lab (TJN) 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	All devices prior to THB, HAST, AC, UHST, TC, PC+PTC and as required per test conditions. SAM SS=11 units for each stress test for each lot when required.			pass	Generic Data: Q243486,S32K144, MAPBGA 100 (CSM7, N57U): 0/462 Q218280,MCIMX31LCVMN4C, MAPBGA 473 (TSMC12, M91E): 0/231 Q221455, MPC8309, MAPBGA 489 (TSMC12, N83A): 0/84 Q224100, SPC5675KFF0MMS2, MAPBGA 473 (TSMC12, N83A): 0/154
HAST	JESD22-A110	**Highly Accelerated Stress Test (HAST):** PC before HAST (for SMDs only): Required HAST = 110°C/85% for 264hrs Bias = Max Vdd	TEST @ RH	77	0	0	pass	Generic Data: Q243486,S32K144, MAPBGA 100 (CSM7, N57U): 0/231
UHST	JESD22-A118	**Unbiased HAST (UHST):** PC before UHST (for SMDs only): Required UHST = 110°C/85%RH for 264hrs	TEST @ R	77	0	0	pass	Generic Data: Q243486,S32K144, MAPBGA 100 (CSM7, N57U): 0/231
TC	JESD22-A104 AEC Q100-Appendix 3	**Temperature Cycle (TC):** PC before TC (for SMDs only): Required TC = -55°C to 125°C for 500 cycles.	TEST @ H	77	0	0	pass	Generic Data: Q218280, MCIMX31LCVMN4C, MAPBGA 473 (TSMC12, M91E): 0/231@-50°C to 150°C, 1000c Q221455, MPC8309, MAPBGA 489 (TSMC12, N83A): 0/84@-55°Cto 155°C, 700c Q224100, SPC5675KFF0MMS2, MAPBGA 473 (TSMC12, N83A): 0/154 @-50°C to 150°C, 1000c
HTSL	JESD22-A103	**High Temperature Storage Life (HTSL):** 150°C for 500 hrs	TEST @ RH	45	0	0	pass	Generic Data: Q218280,MCIMX31LCVMN4C, MAPBGA 473 (TSMC12, M91E): 0/231 Q243486,S32K144, MAPBGA 100 (CSM7, N57U): 0/231

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):** AEC Ta: Grade 3: 85°C for 1000 hours. Bias: 1.77V.	TEST @ RCH	77	0	0	pass	Generic Data: Q190597, PPC8306VMADDC, MAPBGA 369 (TSMC12, N83A): 0/231
ELFR	AEC Q100-008	**Early Life Failure Rate (ELFR):** AEC Ta = 125°C for 48 hrs. Bias: 1.77V	TEST @ RH	800	0	0	pass	Generic Data: Q218280, MCIMX31LCVMN4C, MAPBGA 473 (TSMC12, M91E): 0/2400
EDR	AEC Q100-005	**NVM Endurance, Data Retention, and Operational Life (EDR):** 150°C for 1008 hrs Devices incorporating NVM shall receive 1X 'NVM endurance preconditioning'(W/E cycling). Test R, H, C after W/E cycling. *Timed RO of 96hrs. MAX*	TEST @ RCH	77	0	0	NA	No NVM

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	NA	No bounding recipe change
WBP	MilStd883-2011	**Wire Bond Pull (WBP):** Cond. C or D	Cpk = or > 1.67	30 bonds from minimum 5 units	0	0	NA	No bounding recipe change
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	NA	No solder relvent change.
PD	JESD22-B100	**Physical Dimensions(PD):** PD per NXP drawing	Cpk = or > 1.67	10	0	0	Pass	Characterization data on MCIMX31DVMN5D(TSMC12, M91E).
DIM & BOM		**Dimensional (DIM):** GAO to verify PD results against valid NXP drawing. **BOM Verification (BOM):** GAO to verify qual lot ERF BOM is accurate.		10	0	0	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 reflow cycles at MSL reflow temperature before shear.	Cpk = or >1.67	10 (5 balls from a min. of 10 devices)	0	0	NA	No solder relvent 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	NA	MAPBGA part

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	NXP 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	0	0	NA	The compostion is same, but G770SFL has lower content of alpha filler. There is no changes of molding compound process/ recipe.
HBM	AEC-Q100-002 / JESD22-A114E Jan 2007	**ElectroStatic Discharge/ Human Body Model Classification (HBM):** 2000Volts For AEC, see AEC-Q100-002 for classification levels.	TEST @ RH 2KV min.	3 units per Voltage level	0	0	NA	The compostion is same, but G770SFL has lower content of alpha filler. There is no changes of molding compound process/ recipe.
CDM	AEC-Q100-011	**ElectroStatic Discharge/ Charged Device Model Classification (CDM):** Test @ 250/500 Volts For AEC, see AEC-Q100-011 for classification levels. ***Timed RO of 96hrs MAX.***	TEST @ RH All pins =/> 500V	3 units per Voltage level	0	0	NA	The compostion is same, but G770SFL has lower content of alpha filler. There is no changes of molding compound process/ recipe.
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	NA	The compostion is same, but G770SFL has lower content of alpha filler. There is no changes of molding compound process/ recipe.
ED	AEC-Q100-009, NXP 48A spec	**Electrical Distribution (ED)**	TEST @ RCH	30	0	0	NA	The compostion is same, but G770SFL has lower content of alpha filler. There is no changes of molding compound process/ recipe.
FG	For AEC, AEC-Q100-007	**Fault Grading (FG)**	FG shall be = or > 90% for qual units					The compostion is same, but G770SFL has lower content of alpha filler. There is no changes of molding compound process/ recipe.
CHAR	For AEC, AEC-Q003	**Characterization (CHAR):** Ony performed on new technologies and part families per AEC Q003		30	0	0		The compostion is same, but G770SFL has lower content of alpha filler. There is no changes of molding compound process/ recipe.

Products Being Qualified

Part Number (s)	Fab/Mask Set/Tech	Assembly Site	Pkg Description	Mold Description	EPOXY Description	Wire Description	Solder ball type/size
MCIMX31Cxx/MCIMX31LCxx	TSMC12/ M91E/ H009HLX6	NXP-ATTJ	MAPBGA 473 19*19*0.8 P.8	G770SFL	ABLEBOND 2025D	18um PdCu	SN/AG/CU, 0.4mm

Die Qual Generic data

Quartz#	Part Number (s)	Fab/Mask Set/Tech	Assembly Site	Pkg Description	Mold Description	EPOXY Description	Wire Description	Solder ball type/size
218280	MCIMX31LCVMN4C	TSMC12/ 0M91E/ H009HLX6	NXP-ATTJ	MAPBGA 473 19*19*1.12 P0.8	G770FL	ABLEBOND 2025D	18um PdCu	SN/AG/CU, 0.4mm
190597	PPC8306VMADDC	TSMC12/ 1N83A/ H009HXX7	NXP-ATTJ	MAPBGA 489 19*19*1.61 P0.8	G770SFL	ABLEBOND 2025D	18um PdCu	SN/AG, 0.4mm

Package Qual Generic data

Quartz#	Part Number (s)	Fab/Mask Set/Tech	Assembly Site	Pkg Description	Mold Description	EPOXY Description	Wire Description	Solder Ball
221455	MPC8309	TSMC12/ 1N83A/ H009HXX7	NXP-ATTJ	MAPBGA 489 19*19*1.61 P0.8	G770SFL	ABLEBOND 2025D	18um PdCu	SN/AG, 0.4mm
243486	S32K144	CSM7/ 0N57U/ H009FTH4	NXP-ATTJ	MAPBGA 100 11*11*1.07 P1	G770SFL	ABLEBOND 2025D	20um PdCu	SN/AG, 0.5mm
224100	SPC5675KFF0MMS2	ATMC / 0N72D / H009FHX6	NXP-ATTJ	MAPBGA 473 19*19*1.18 P0.8	G770SFL	ABLEBOND 2025D	20um Pd Cu	SN/AG, 0.4mm
	MCIMX31DVMN5D	TSMC12/ 0M91E/ H009HLX6	NXP-ATTJ	MAPBGA 473 19*19*1.18 P0.8	G770SFL	ABLEBOND 2025D	20um Pd Cu	SN/AG/CU, 0.4mm

Revision	Date	Comments	Author
Rev. 1.0	14-Mar-23	Qual Report	Diego Liu