PCN Number:	20240212000.1	**PCN Date:**	February 16, 2024
Title:	Conversion to TSMC 0.6/0.5um Hybrid Process		
Customer Contact:	Change Management team	**Dept:**	Quality Services
Proposed 1st Ship Date:	May 16, 2024	**Sample requests accepted until:**	March 17, 2024*

***Sample requests received after March 17, 2024 will not be supported.**

Change Type:

☐	Assembly Site	☐	Design	☐	Wafer Bump Material
☐	Assembly Process	☐	Data Sheet	☐	Wafer Bump Process
☐	Assembly Materials	☐	Part number change	☐	Wafer Fab Site
☐	Mechanical Specification	☐	Test Site	☐	Wafer Fab Material
☐	Packing/Shipping/Labeling	☐	Test Process	☒	Wafer Fab Process

PCN Details

Description of Change:

This change notification is to announce the conversion from the current TSMC 0.6um back end metallization/REB Etch Back process to the TSMC 0.5um Tungsten plug back end process for the selected devices listed in the "Product Affected" section.

Change From	Change To
0.6um TSMC Backend Process IMD layer: PEOX + SOG DEP+ PEOX Metal: Ti / AlSiCu / TiN	0.5um TSMC Backend Process IMD layer: PEOX+SACVD-OX+PEOX+SOG dep. & Etch back+PEOX Metal: Via Plug TiN/WCVD/AlCu /TiN

Reason for Change:

Quality Improvement.

Anticipated impact on Fit, Form, Function, Quality or Reliability (positive / negative):

None.

Changes to product identification resulting from this notification:

None.

Product Affected:

INA331AIDGKR	INA331AIDGKTG4	INA331IDGKTG4	OPA2348AIDR
INA331AIDGKT	INA331IDGKT	INA331-W	XINA331IRUCR

Qualification Results

Data Displayed as: Number of lots / Total sample size / Total failed

Type	#	Test Spec	Min Lot Qty	SS / Lot	Test Name	Condition	Duration	Qual Device: OPA2348AQDRQ1	QBS Package Reference: UCC28C56HQDRQ1	QBS Process Reference: OPA356AQDBVRQ1	QBS Package Reference: TLV2314QDRQ1	QBS Package Reference: SN65HVD1781AQDRQ1	QBS Product Reference: OPA348AQDRQ1	QBS Package Reference: SN74AHCT244QDWRQ1
Test Group A - Accelerated Environment Stress Tests														
PC	A1	JEDEC J-STD-020 JESD22-A113	3	77	Preconditioning	MSL1 260C	-	1/Pass	1/Pass	-	1/Pass	3/Pass	-	3/Pass
PC	A1	JEDEC J-STD-020 JESD22-A113	3	77	Preconditioning	MSL2 260C	-	-	-	3/Pass	-	-	-	-
HAST	A2	JEDEC JESD22-A110	3	77	Biased HAST	130C/85%RH	96 Hours	1/77/0	1/77/0	3/77/0	1/77/0	3/231/0	1/77/0	-

Type	#	Test Spec	Min Lot Qty	SS / Lot	Test Name	Condition	Duration	Qual Device: OPA2348AQDRQ1	QBS Package Reference: UCC28C56HQDRQ1	QBS Process Reference: OPA356AQDBVRQ1	QBS Package Reference: TLV2314QDRQ1	QBS Package Reference: SN65HVD1781AQDRQ1	QBS Product Reference: OPA348AQDRQ1	QBS Package Reference: SN74AHCT244QDWRQ1
AC/UHAST	A3	JEDEC JESD22-A102/JEDEC JESD22-A118	3	77	Autoclave	121C/15psig	96 Hours	-	1/77/0	3/77/0	1/77/0	3/231/0	-	3/231/0
AC/UHAST	A3	JEDEC JESD22-A102/JEDEC JESD22-A118	3	77	Unbiased HAST	130C/85%RH	96 Hours	1/77/0	-	-	-	-	-	-
TC	A4	JEDEC JESD22-A104 and Appendix 3	3	77	Temperature Cycle	-65C/150C	500 Cycles	1/77/0	1/77/0	3/77/0	1/77/0	3/231/0	-	3/231/0
TC-BP	A4	MIL-STD883 Method 2011	1	5	Post Temp Cycle Bond Pull	-	-	1/5/0	1/5/0	1/5/0	1/5/0	1/50/0	1/30/0	3/15/0
HTSL	A6	JEDEC JESD22-A103	1	45	High Temperature Storage Life	150C	1000 Hours	-	4/308/0	-	-	-	-	-
HTSL	A6	JEDEC JESD22-A103	1	45	High Temperature Storage Life	175C	500 Hours	1/45/0	-	1/45/0	1/45/0	1/45/0	-	3/135/0
Test Group B - Accelerated Lifetime Simulation Tests														
HTOL	B1	JEDEC JESD22-A108	3	77	Life Test	125C	1000 Hours	-	1/77/0	3/77/0	1/77/0	2/154/0	-	-
HTOL	B1	JEDEC JESD22-A108	3	77	Life Test	140C	480 Hours	-	-	-	-	1/77/0	-	-
HTOL	B1	JEDEC JESD22-A108	3	77	Life Test	150C	300 Hours	1/77/0	-	-	-	-	-	-
ELFR	B2	AEC Q100-008	3	800	Early Life Failure Rate	125C	48 Hours	-	-	3/800/0	-	-	-	-
Test Group C - Package Assembly Integrity Tests														
WBS	C1	AEC Q100-001	1	30	Wire Bond Shear	Minimum of 5 devices, 30 wires Cpk>1.67	Wires	1/30/0	3/90/0	1/30/0	1/30/0	3/228/0	-	3/90/0
WBP	C2	MIL-STD883 Method 2011	1	30	Wire Bond Pull	Minimum of 5 devices, 30 wires Cpk>1.67	Wires	1/30/0	3/90/0	1/30/0	1/30/0	3/228/0	-	3/90/0
SD	C3	JEDEC J-STD-002	1	15	PB Solderability	>95% Lead Coverage	-	-	1/15/0	-	1/15/0	-	-	3/35/0
SD	C3	JEDEC J-STD-002	1	15	PB-Free Solderability	>95% Lead Coverage	-	-	1/15/0	-	1/15/0	-	-	3/45/0
PD	C4	JEDEC JESD22-B100 and B108	3	10	Physical Dimensions	Cpk>1.67	-	1/10/0	3/30/0	1/10/0	3/30/0	3/30/0	-	3/30/0
Test Group D - Die Fabrication Reliability Tests														

Type	#	Test Spec	Min Lot Qty	SS / Lot	Test Name	Condition	Duration	Qual Device: OPA2348AQDRQ1	QBS Package Reference: UCC28C56HQDRQ1	QBS Process Reference: OPA356AQDBVRQ1	QBS Package Reference: TLV2314QDRQ1	QBS Package Reference: SN65HVD1781AQDRQ1	QBS Product Reference: OPA348AQDRQ1	QBS Package Reference: SN74AHCT244QDWRQ1
EM	D1	JESD61	-	-	Electromigration	-	-	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements
TDDB	D2	JESD35	-	-	Time Dependent Dielectric Breakdown	-	-	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements
HCI	D3	JESD60 & 28	-	-	Hot Carrier Injection	-	-	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements
BTI	D4	-	-	-	Bias Temperature Instability	-	-	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements
SM	D5	-	-	-	Stress Migration	-	-	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements
Test Group E - Electrical Verification Tests														
ESD	E2	AEC Q100-002	1	3	ESD HBM	-	16000 Volts	-	-	-	-	1/3/0	-	-
ESD	E2	AEC Q100-002	1	3	ESD HBM	-	2000 Volts	1/3/0	-	1/3/0	1/3/0	-	1/3/0	-
ESD	E2	AEC Q100-002	1	3	ESD HBM	-	2500 Volts	-	1/3/0	-	-	-	-	-
ESD	E2	AEC Q100-002	1	3	ESD HBM	-	4000 Volts	-	-	-	-	1/3/0	-	-
ESD	E3	AEC Q100-011	1	3	ESD CDM	-	1500 Volts	-	-	-	-	1/3/0	-	-
ESD	E3	AEC Q100-011	1	3	ESD CDM	-	2000 Volts	-	1/3/0	-	-	-	-	-
ESD	E3	AEC Q100-011	1	3	ESD CDM	-	500 Volts	1/3/0	-	1/3/0	1/3/0	-	1/3/0	-
LU	E4	AEC Q100-004	1	6	Latch-Up	Per AEC Q100-004	-	1/77/0	1/6/0	1/6/0	2/12/0	1/6/0	1/6/0	-
ED	E5	AEC Q100-009	3	30	Electrical Distributions	Cpk>1.67 Room, hot, and cold	-	1/30/0	1/90/0	3/90/0	3/90/0	3/90/0	3/90/0	-
Additional Tests														

- Preconditioning was performed for Autoclave, Unbiased HAST, THB/Biased HAST, Temperature Cycle, Thermal Shock, and HTSL, as applicable
- The following are equivalent HTOL options based on an activation energy of 0.7eV : 125C/1k Hours, 140C/480 Hours, 150C/300 Hours, and 155C/240 Hours
- The following are equivalent HTSL options based on an activation energy of 0.7eV : 150C/1k Hours, and 170C/420 Hours
- The following are equivalent Temp Cycle options per JESD47 : -55C/125C/700 Cycles and -65C/150C/500 Cycles

Ambient Operating Temperature by Automotive Grade Level:

- Grade 0 (or E): -40C to +150C
- Grade 1 (or Q): -40C to +125C
- Grade 2 (or T): -40C to +105C
- Grade 3 (or I) : -40C to +85C

E1 (TEST): Electrical test temperatures of Qual samples (High temperature according to Grade level):

- Room/Hot/Cold : HTOL, ED
- Room/Hot : THB / HAST, TC / PTC, HTSL, ELFR, ESD & LU
- Room : AC/uHAST

Quality and Environmental data is available at TI's external Web site: http://www.ti.com/

TI Qualification ID: R-CHG-2301-048

Qualification Results

Data Displayed as: Number of lots / Total sample size / Total failed

Type	#	Test Name	Condition	Duration	Qual Device: INA331IDGKT	QBS Reference: OPA356AQDBVRQ1	QBS Reference: OPA348AIDCKR
HAST	A2	Biased HAST	130C/85%RH	96 Hours	-	3/231/0	-
UHAST	A3	Autoclave	121C/15psig	96 Hours	-	3/230/0	1/77/0
TC	A4	Temperature Cycle	-65C/150C	500 Cycles	-	3/230/0	1/77/0
HTSL	A6	High Temperature Storage Life	175C	500 Hours	-	1/45/0	-
HTOL	B1	Life Test	125C	1000 Hours	-	3/231/0	-
ELFR	B2	Early Life Failure Rate	125C	48 Hours	-	3/2400/0	-
ESD	E2	ESD CDM	-	500 Volts	1/3/0	1/3/0	1/3/0
ESD	E2	ESD HBM	-	2000 Volts	1/3/0	1/3/0	1/3/0
LU	E4	Latch-Up	Per JESD78	-	1/3/0	1/6/0	1/6/0
CHAR	E5	Electrical Characterization	Per Datasheet Parameters	-	1/30/0	3/90/0	1/30/0

- QBS: Qual By Similarity
- Qual Device INA331IDGKT is qualified at MSL2 260C

- Preconditioning was performed for Autoclave, Unbiased HAST, THB/Biased HAST, Temperature Cycle, Thermal Shock, and HTSL, as applicable
- The following are equivalent HTOL options based on an activation energy of 0.7eV : 125C/1k Hours, 140C/480 Hours, 150C/300 Hours, and 155C/240 Hours
- The following are equivalent HTSL options based on an activation energy of 0.7eV : 150C/1k Hours, and 170C/420 Hours
- The following are equivalent Temp Cycle options per JESD47 : -55C/125C/700 Cycles and -65C/150C/500 Cycles

Quality and Environmental data is available at TI's external Web site: http://www.ti.com/

TI Qualification ID: R-CHG-2210-015

For questions regarding this notice, e-mails can be sent to the Change Management team or your local Field Sales Representative.

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