

<b>PCN Number:</b>	20191211000.2	<b>PCN Date:</b>	Dec 12, 2019
<b>Title:</b>	Qualification of additional Fab site (CFAB) and Wafer Probe site (CLARK-PR) options and Wafer Bump material change for select devices		
<b>Customer Contact:</b>	<a href="#">PCN Manager</a>	<b>Dept:</b>	Quality Services
<b>Proposed 1<sup>st</sup> Ship Date:</b>	Jun 12, 2020	<b>Estimated Sample Availability:</b>	Date provided at sample request.
<b>Change Type:</b>			
<input type="checkbox"/> Assembly Site	<input type="checkbox"/> Assembly Process	<input type="checkbox"/> Assembly Materials	
<input type="checkbox"/> Design	<input type="checkbox"/> Electrical Specification	<input type="checkbox"/> Mechanical Specification	
<input checked="" type="checkbox"/> Test Site	<input type="checkbox"/> Packing/Shipping/Labeling	<input type="checkbox"/> Test Process	
<input type="checkbox"/> Wafer Bump Site	<input checked="" type="checkbox"/> Wafer Bump Material	<input type="checkbox"/> Wafer Bump Process	
<input checked="" type="checkbox"/> Wafer Fab Site	<input type="checkbox"/> Wafer Fab Materials	<input type="checkbox"/> Wafer Fab Process	
	<input type="checkbox"/> Part number change		

### PCN Details

#### Description of Change:

This change notification is to announce the qualification of CFAB as an additional wafer fab site and CLARK-PR as additional probe site options for select devices in the LBC5 technology. Additionally, this notification announces the qualification of a Polyimide die coat addition for the selected devices listed in the "Product Affected" section.

Current Site				Additional Site			
Current Fab Site	Fab Process	Probe Site	Wafer Diameter	New Fab Site	Fab Process	Probe Site	Wafer Diameter
DP1DM5	LBC5	SCT	200mm	CFAB	LBC5	CLARK-PR	200mm

Current Die Coat	New Die Coat
None	PI

The LBC5 process technology has been running successfully in production at CFAB since 2012.

#### Reason for Change:

Continuity of Supply

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

None

#### Changes to product identification resulting from this PCN:

##### Current:

Chip Site	Chip Site Origin Code (20L)	Chip Site Country Code (21L)	Chip Site City
DP1DM5	DM5	USA	Dallas

##### New:

Chip Site	Chip Site Origin Code (20L)	Chip Site Country Code (21L)	Chip Site City
<b>CFAB</b>	<b>CU3</b>	<b>CHN</b>	<b>Chengdu</b>

Sample product shipping label (not actual product label)


**TEXAS INSTRUMENTS**  
 MADE IN: Malaysia  
 2DC: 20:



MSL 2 / 260C / 1 YEAR	SEAL DT
MSL 1 / 235C / UNLIM	03/29/04

OPT:  
 ITEM: 39  
**LBL: 5A (L)T0:1750**

(1P) SN74LS07NSR  
 (Q) 2000 (D) 0336  
 (31T) LOT: 3959047MLA  
 (4W) TKY (1T) 7523483S12  
 (P)  
 (2P) REV: (V) 0033317  
 (20L) CS0: SHP (21L) CC0: USA  
 (22L) AS0: MLA (23L) AC0: MYS

**Product Affected:**

**Group 1: Adding CFAB as an additional site and Polyimide die coat**

TAS5412TPHDRQ1	TAS5414BTPHDQ1	TAS5424BTDKDRQ1	TAS5514BTDKDRQ1
TAS5414BTDKDRQ1	TAS5414BTPHDRQ1	TAS5424BTDKERQ1	

**Group 2: Adding CFAB, Polyimide die coat and CLARK-PR**

TAS5414CTPHDRQ1	TAS5404TPHDRQ1
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**Automotive New Product Qualification Summary**

(As per AEC-Q100, and JEDEC Guidelines)

**Qual for TAS5414BTPHDRQ1 and TAS5414CTPHDRQ1 (Q006) to support the offload from DMOS5 to CFAB**

**Approved 11/05/2019**

**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: TAS5414BTPHDRQ1	QBS Product, Process and Package Reference: TAS5414CTPHDRQ1	QBS Product Reference: TPS43340QPHPRQ1	QBS Process Reference: S301044APFPRG4
<b>Test Group A – Accelerated Environment Stress Tests</b>										
PC	A1	JEDEC J-STD-020 JESD22-A113	3	77	Automotive Preconditioning	Level 3-260C	-	3/1106/0 (1)	1/300/0	3/1619/0
-	-	-	-	-	SAM Analysis Post Precon	Completed	-	No Fails	-	-
HAST	A2	JEDEC JESD22-A110	3	77	Biased HAST, 130C/85%RH	96 Hours	-	3/239/0 (2)	-	3/240/0
-	-	-	3	1	Cross-section Post HAST 96 Hours	Completed	-	1/1/0	-	-
-	-	-	3	30	Ball Bond Pull Post HAST 96 Hours	Wires	-	3/90/0	-	-
-	-	-	3	30	Stitch Bond Pull Post HAST 96 Hours	Wires	-	3/90/0	-	-
-	-	-	3	30	Bond Shear Post HAST 96 Hours	Wires	-	3/90/0	-	-
HAST	A2	JEDEC JESD22-A110	3	70	Biased HAST, 130C/85%RH	192 Hours	-	3/210/0	-	-
-	-	-	3	1	Cross-section Post HAST 192 Hours	Completed	-	3/3/0	-	-
-	-	-	3	22	SAM Analysis Post HAST 192 Hours	Completed	-	3/66/0	-	-
-	-	-	3	30	Ball Bond Pull Post HAST 192 Hours	Wires	-	3/90/0	-	-
-	-	-	3	30	Stitch Bond Pull Post HAST 192 Hours	Wires	-	3/90/0	-	-
-	-	-	3	30	Bond Shear Post HAST 192 Hours	Wires	-	3/90/0	-	-
AC	A3	JEDEC JESD22-A102	3	77	Autoclave 121C	96 Hours	-	3/231/0	1/82/0	3/231/0
TC	A4	JEDEC JESD22-A104 and Appendix 3	3	77	Temperature Cycle, -65/150C	500 Cycles	-	3/297/0	1/109/0	3/231/0
-	-	-	3	1	Cross-section Post T/C 500 Cycles	Completed	-	2/2/0	-	-
-	-	-	3	22	SAM Analysis Post T/C 500 Cycles	Completed	-	3/66/0	-	-
-	-	-	3	30	Ball Bond Pull Post T/C 500 Cycles	Wires	-	3/90/0	-	-
-	-	-	3	30	Stitch Bond Pull Post T/C 500 Cycles	Wires	-	3/90/0	-	-
-	-	-	3	30	Bond Shear Post T/C 500 Cycles	Wires	-	3/90/0	-	-
TC	A4	JEDEC JESD22-A104 and Appendix 3	3	77	Post Temp. Cycle, Bond Pull	500 Cycles	-	3/30/0	1/22/0	3/15/0
TC	A4	JEDEC JESD22-A104 and Appendix 3	3	70	Temperature Cycle, -65/150C	1000 Cycles	-	3/210/0	-	-
-	-	-	3	1	Cross-section Post T/C 1000 Cycles	Completed	-	3/3/0	-	-
-	-	-	3	22	SAM Analysis Post T/C 1000 Cycles	Completed	-	3/66/0 (1)	-	-
-	-	-	3	22	Ball Bond Pull Post T/C 1000 Cycles	Wires	-	3/66/0	-	-
-	-	-	3	30	Stitch Bond Pull Post T/C 1000 Cycles	Wires	-	3/90/0	-	-
-	-	-	3	30	Bond Shear Post T/C 1000 Cycles	Wires	-	3/90/0	-	-
PTC	A5	JEDEC JESD22-A105	1	45	Power Temperature Cycle, -40/125C	1000 Cycles	-	1/45/0	1/48/0	1/50/0
HTSL	A6	JEDEC JESD22-A103	1	45	High Temp. Storage Bake, 150C	1000 Hours	-	3/135/0	-	-
-	-	-	3	1	Cross-section Post HTSB 1000 Hours	Completed	-	3/3/0	-	-
HTSL	A6	JEDEC JESD22-A103	1	44	High Temp. Storage Bake, 150C	2000 Hours	-	3/132/0	-	-
-	-	-	3	1	Cross-section Post HTSB 2000 Hours	Completed	-	3/3/0	-	-
HTSL	A6	JEDEC JESD22-A103	1	45	High Temp. Storage Bake, 175C	500 Hours	-	-	-	1/45/0

Test Group B – Accelerated Lifetime Simulation Tests									
HTOL	B1	JEDEC JESD22-A108	3	77	Life Test, 125C	1000 Hours	-	1/77/0	-
HTOL	B1	JEDEC JESD22-A108	3	77	Life Test, 140C	653 Hours	-	-	3/231/0
ELFR	B2	AEC Q100-008	3	800	Early Life Failure Rate, 125C	48 Hours	-	1/831/0	3/2399/0
ELFR	B2	AEC Q100-008	3	800	Early Life Failure Rate, 125C	24 Hours	-	1/800/0	-
EDR	B3	AEC Q100-005	3	77	NVM Endurance, Data Retention, and Operational Life	--	-	N/A	-
Test Group C – Package Assembly Integrity Tests									
WBS	C1	AEC Q100-001	1	30	Post Temp. Cycle, Bond Shear	500 Cycles	-	3/30/0	3/15/0
WBS	C1	AEC Q100-001	1	30	Bond Shear (Cpk>1.67)	Wires	-	3/30/0	-
WBP	C2	MIL-STD883 Method 2011	1	30	Bond Pull (Cpk>1.67)	Wires	-	3/30/0	-
SD	C3	JEDEC JESD22-B102	1	15	Surface Mount Solderability (>95% Lead Coverage)	Pb & Pb-Free	-	1/60/0	-
LI	C6	JEDEC JESD22-B105	1	50	Lead Integrity	Leads	-	-	-
Test Group D – Die Fabrication Reliability Tests									
EM	D1	JESD61	-	-	Electromigration	--	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	-
HCI	D3	JESD60 & 28	-	-	Hot Injection Carrier	--	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	-
NBTI	D4	-	-	-	Negative Bias Temperature Instability	--	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	-
SM	D5	-	-	-	Stress Migration	--	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	-
Test Group E – Electrical Verification Tests									
HBM	E2	AEC Q100-002	1	3	ESD - HBM	3000 V	1/3/0	3/9/0	1/3/0
CDM	E3	AEC Q100-011	1	3	ESD - CDM	700 V	1/3/0	3/9/0	1/3/0
LU	E4	AEC Q100-004	1	6	Latch-up	(Per AEC Q100-004)	1/6/0	3/6/0	1/6/0
ED	E5	AEC Q100-009	3	30	Electrical Distributions	Cpk>1.67	1/30/0	3/30/0	Pass 1/90/0

**A1 (PC): Preconditioning:** Performed for THB, Biased HAST, AC, uHAST, TC & PTC samples, as applicable.

- (1) One unit lost
- (2) One unit lost a pin, not qual related

**Ambient Operating Temperature by Automotive Grade Level:**

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

**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

**Green/Pb-free Status:**

Qualified Pb-Free (SMT) and Green

**Qualification Report**

**Qual for TAS54x4 PI addition  
Approve Date 06-Nov-2019**

**Qualification Results**

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

Type	Test Name / Condition	Duration	Qual Device: TAS5414CTPHDRQ1 (CFAB)	Qual Device: TAS5414CTPHDRQ1 (DMOS5)	Qual Device: TAS5424BTDKDRQ1 (CFAB)	Qual Device: TAS5424BTDKDRQ1 (DMOS5)	QBS Product / Package Reference: TAS5414BTPHD	QBS Product / Package Reference: TAS5414CTPHDRQ1	QBS Product / Package Reference: TAS5424BTDKDRQ1	QBS Product / Package Reference: TPS43340QPHPRQ1
AC	Autoclave 121C	96 Hours	-	-	-	-	3/231/0	-	3/231/0	1/77/0
ED	Electrical Distributions	Cpk>1.67	-	-	-	-	3/90/0	1/30/0	-	1/30/0
ELFR	Early Life Failure Rate, 125C	48 Hours	-	-	-	-	3/2400/0	-	-	1/831/0
HAST	Biased HAST, 130C/85%RH	96 Hours	-	-	-	-	3/231/1 (1)	-	3/231/0	-
CDM	ESD - CDM	750 V	-	-	-	-	-	1/3/0	-	-
HBM	ESD - HBM	3000 V	-	-	-	-	1/3/0	-	-	-
HTOL	Life Test, 125C	1000 Hours	-	-	-	-	3/231/0	-	-	1/77/0
HTSL	High Temp. Storage Bake, 150C	1000 Hours	-	-	-	-	2/100/0	-	3/150/0	-
LU	Latch-up	(per JESD78)	-	-	-	-	1/6/0	1/6/0	-	1/6/0
SD	Surface Mount Solderability	Pb Free	-	-	-	-	-	-	1/22/0	-
TC	Temperature Cycle, -65/150C	500 Cycles	1/77/0	1/77/0	1/77/0	1/77/0	3/231/1 (2)	1/77/0	3/231/0	1/77/0
WBP	Bond Pull	Wires	1/30/0	1/30/0	1/30/0	1/30/0	-	1/30/0	-	-
WBS	Bond Shear	Wires	1/30/0	1/30/0	1/30/0	1/30/0	-	1/30/0	-	-

- QBS: Qual By Similarity

- Qual Devices qualified at LEVEL3-260C: TAS5424BTDKDRQ1 (CFAB), TAS5424BTDKDRQ1 (DMOS5), TAS5414CTPHDRQ1 (DMOS5), TAS5414CTPHDRQ1 (CFAB)

- 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/231 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/>

**Green/Pb-free Status:**

Qualified Pb-Free (SMT) and Green

Note (1): One EOS fail evaluated in QTS 337904-1. See 8D report attached to eQDB.

Note (2): One fail due to Cu particle unrelated to package qual and evaluated in QTS 338008-1. See 8D report attached to eQDB.

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