

PCN Number:	20231219020.2	PCN Date:	December 22, 2023																					
Title:	Qualification of RFAB using qualified Process Technology, Die Revision and additional Assembly & Test sites/BOM options for select devices																							
Customer Contact:	Change Management team	Dept:	Quality Services																					
Proposed 1st Ship Date:	Jun 20, 2024	Sample requests accepted until:	Jan 20, 2024*																					
*Sample requests received after January 20, 2024 will not be supported.																								
Change Type:																								
<input checked="" type="checkbox"/> Assembly Site	<input checked="" type="checkbox"/> Design	<input type="checkbox"/> Wafer Bump Material																						
<input checked="" type="checkbox"/> Assembly Process	<input type="checkbox"/> Data Sheet	<input type="checkbox"/> Wafer Bump Process																						
<input checked="" type="checkbox"/> Assembly Materials	<input type="checkbox"/> Part number change	<input checked="" type="checkbox"/> Wafer Fab Site																						
<input type="checkbox"/> Mechanical Specification	<input checked="" type="checkbox"/> Test Site	<input checked="" type="checkbox"/> Wafer Fab Materials																						
<input checked="" type="checkbox"/> Packing/Shipping/Labeling	<input type="checkbox"/> Test Process	<input checked="" type="checkbox"/> Wafer Fab Process																						
PCN Details																								
Description of Change:																								
Texas Instruments is pleased to announce the addition of RFAB using the LBC9 qualified process technology and additional Assembly & Test sites (MLA) and BOM options for select devices listed below in the product affected section.																								
<table border="1"> <thead> <tr> <th colspan="3">Current Fab Site</th> <th colspan="3">Additional Fab Site</th> </tr> <tr> <th>Current Fab Site</th> <th>Process</th> <th>Wafer Diameter</th> <th>Additional Fab Site</th> <th>Process</th> <th>Wafer Diameter</th> </tr> </thead> <tbody> <tr> <td>SFAB</td> <td>J11</td> <td>150 mm</td> <td rowspan="2">RFAB</td> <td rowspan="2">LBC9</td> <td rowspan="2">300 mm</td> </tr> <tr> <td>DL-LIN</td> <td>LINCOS</td> <td>150 mm</td> </tr> </tbody> </table>			Current Fab Site			Additional Fab Site			Current Fab Site	Process	Wafer Diameter	Additional Fab Site	Process	Wafer Diameter	SFAB	J11	150 mm	RFAB	LBC9	300 mm	DL-LIN	LINCOS	150 mm	
Current Fab Site			Additional Fab Site																					
Current Fab Site	Process	Wafer Diameter	Additional Fab Site	Process	Wafer Diameter																			
SFAB	J11	150 mm	RFAB	LBC9	300 mm																			
DL-LIN	LINCOS	150 mm																						
The die was also changed as a result of the process change.																								
Construction differences are as follows:																								
Group 1 Device:																								
	FMX	MLA																						
Bond wire composition, diameter	Cu, 1.0 mil	Cu, 0.8 mil																						
Group 2 Device:																								
	FMX	MLA																						
Bond wire composition, diameter	Au, 0.96 mil	Cu, 0.8 mil																						
Test coverage, insertions, conditions will remain consistent with current testing.																								
Qual details are provided in the Qual Data Section.																								
Reason for Change:																								
These changes are part of our multiyear plan to transition products from our 150-millimeter and 200-millimeter factories to newer, more efficient manufacturing processes and technologies, underscoring our commitment to product longevity and supply continuity.																								
Anticipated impact on Form, Fit, Function, Quality or Reliability (positive / negative):																								
None																								
Impact on Environmental Ratings:																								
Checked boxes indicate the status of environmental ratings following implementation of this change. If below boxes are checked, there are no changes to the associated environmental ratings.																								
RoHS	REACH	Green Status	IEC 62474																					
<input checked="" type="checkbox"/> No Change	<input checked="" type="checkbox"/> No Change	<input checked="" type="checkbox"/> No Change	<input checked="" type="checkbox"/> No Change																					

Changes to product identification resulting from this PCN:**Fab Site Information:**

Chip Site	Chip Site Origin Code (20L)	Chip Site Country Code (21L)	Chip Site City
DL-LIN	DLN	USA	Dallas
SH-BIP-1	SHE	USA	Sherman
RFAB	RFB	USA	Richardson

Die Rev:**Current****New**

Die Rev [2P]	Die Rev [2P]
A, B	B

Assembly/Test Site Information:

Assembly Site	Assembly Site Origin (22L)	Assembly Country Code (23L)	Assembly City
FMX	MEX	MEX	Aguascalientes
MLA	MLA	MYS	Kuala Lumpur

Sample product shipping label (not actual product label)

 **TEXAS INSTRUMENTS**
MADE IN: Malaysia
2DC: 2Q:
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) 7523483SI2
(P)
(2P) REV: (V) 0000017
(20L) CSO: SHE (21L) CCO:USA
(22L) ASO: MLA (23L) ACO: MYS

Group 1 Product Affected:

LP2901IDRQ1	SN104569DR
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Group 2 Product Affected:

TLC3704IDRDL	TLC3704QDRQ1	TLC3704QDRG4Q1
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For alternate parts with similar or improved performance, please visit the product page on TI.com

Automotive New Product Qualification Summary
(As per AEC-Q100 Rev. H and JEDEC Guidelines)

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: TLC3704QDRQ1	QBS Package Reference: OPA2991QDGKRQ1	QBS Package, Process Reference: OPA4991QDRQ1	QBS Product Reference: TLV1812QDRQ1	QBS Product Reference: TLV1822QDRQ1	QBS Package, Process Reference: OPA2991QDRQ1
Test Group A - Accelerated Environment Stress Tests													
PC	A1	JEDEC J-STD-020 JESD22-A113	3	77	Preconditioning	MSL1 260C	-	1/308/0	-	3/924/0	1/308/0	-	3/924/0
HAST	A2	JEDEC JESD22-A110	3	77	Biased HAST	130C/85%RH	96 Hours	1/77/0	-	3/231/0	1/77/0	-	3/231/0
AC/UHAST	A3	JEDEC JESD22-A102/JEDEC JESD22-A118	3	77	Unbiased HAST	130C/85%RH	96 Hours	1/77/0	-	3/231/0	1/77/0	-	3/231/0
TC	A4	JEDEC JESD22-A104 and Appendix 3	3	77	Temperature Cycle	-65C/150C	500 Cycles	1/77/0	-	3/231/0	1/77/0	-	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
HTSL	A6	JEDEC JESD22-A103	1	45	High Temperature Storage Life	150C	1000 Hours	-	-	-	-	-	3/135/0
HTSL	A6	JEDEC JESD22-A103	1	45	High Temperature Storage Life	175C	500 Hours	1/77/0	-	1/45/0	1/77/0	-	-
HTSL	A6	JEDEC JESD22-A103	1	45	High Temperature Storage Life	175C	630 Hours	-	-	-	-	-	-
Test Group B - Accelerated Lifetime Simulation Tests													
HTOL	B1	JEDEC JESD22-A108	3	77	Life Test	150C	300 Hours	-	-	1/77/0	1/77/0	-	-
HTOL	B1	JEDEC JESD22-A108	3	77	Life Test	150C	408 Hours	-	3/231/0	1/77/0	1/77/0	-	-
Type	#	Test Spec	Min Lot Qty	SS / Lot	Test Name	Condition	Duration	Qual Device: TLC3704QDRQ1	QBS Package Reference: OPA2991QDGKRQ1	QBS Package, Process Reference: OPA4991QDRQ1	QBS Product Reference: TLV1812QDRQ1	QBS Product Reference: TLV1822QDRQ1	QBS Package, Process Reference: OPA2991QDRQ1
ELFR	B2	AEC Q100-008	3	800	Early Life Failure Rate	125C	48 Hours	-	3/24000	-	-	-	-
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	-	1/30/0	1/30/0	-	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	-	1/30/0	1/30/0	-	3/90/0
SD	C3	JEDEC J-STD-002	1	15	PB Solderability	>95% Lead Coverage	-	1/15/0	-	-	1/15/0	-	-
SD	C3	JEDEC J-STD-002	1	15	PB-Free Solderability	>95% Lead Coverage	-	1/15/0	-	-	1/15/0	-	-
PD	C4	JEDEC JESD22-B100 and B108	3	10	Physical Dimensions	Cpk>1.67	-	1/10/0	-	-	1/10/0	-	3/30/0
Test Group D - Die Fabrication Reliability Tests													
EM	D1	JESD61	-	-	Electromigration	-	-	Completed Per Process Technology Requirements	-	-	-	-	-
Tddb	D2	JESD35	-	-	Time Dependent Dielectric Breakdown	-	-	Completed Per Process Technology Requirements	-	-	-	-	-
HCI	D3	JESD60 & 28	-	-	Hot Carrier Injection	-	-	Completed Per Process Technology Requirements	-	-	-	-	-
BTI	D4	-	-	-	Bias Temperature Instability	-	-	Completed Per Process Technology Requirements	-	-	-	-	-
SM	D5	-	-	-	Stress Migration	-	-	Completed Per Process Technology Requirements	-	-	-	-	-
Test Group E - Electrical Verification Tests													
ESD	E2	AEC Q100-002	1	3	ESD HBM	-	2000 Volts	1/3/0	-	-	-	1/3/0	1/3/0

Type	#	Test Spec	Min Lot Qty	SS / Lot	Test Name	Condition	Duration	Qual Device: TLC3704QDRQ1	QBS Package Reference: OPA2991QDGKRQ1	QBS Package, Process Reference: OPA4991QDRQ1	QBS Product Reference: TLV1812QDRQ1	QBS Product Reference: TLV1822QDRQ1	QBS Package, Process Reference: OPA2991QDRQ1
ESD	E3	AEC Q100-011	1	3	ESD CDM	-	500 Volts	1/3/0	-	-	-	-	-
LU	E4	AEC Q100-004	1	6	Latch-Up	Per AEC Q100-004	-	1/6/0	-	-	-	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	-	-	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 JEDEC47: -55C/125C/700 Cycles and -65C/150C/500 Cycles
- QBS: Qual By Similarity
- Qual Device TLC3704QDRQ1 is qualified at MSL1 260C

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 J): -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/HAUT

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

TI Qualification ID: R-CHG-2311-060

Automotive New Product Qualification Summary (As per AEC-Q100 Rev. H and JEDEC Guidelines)

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: LP2901IDRQ1	QBS Package Reference: OPA2991QDGKRQ1	QBS Package, Process Reference: OPA4991QDRQ1	QBS Product Reference: TLV1812QDRQ1	QBS Package, Process Reference: OPA2991QDRQ1
Test Group A - Accelerated Environment Stress Tests												
PC	A1	JEDEC J-STD-020 JESD22-A113	3	77	Preconditioning	MSL1 260C	-	1/308/0	-	3/924/0	1/308/0	3/924/0
HAST	A2	JEDEC JESD22-A110	3	77	Biased HAST	130C/85%RH	96 Hours	1/77/0	-	3/231/0	1/77/0	3/231/0
AC/HAUT	A3	JEDEC JESD22-A102/JEDEC JESD22-A118	3	77	Unbiased HAST	130C/85%RH	96 Hours	1/77/0	-	3/231/0	1/77/0	3/231/0
TC	A4	JEDEC JESD22-A104 and Appendix 3	3	77	Temperature Cycle	-65C/150C	500 Cycles	1/77/0	-	3/231/0	1/77/0	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
HTSL	A6	JEDEC JESD22-A103	1	45	High Temperature Storage Life	150C	1000 Hours	-	-	-	-	3/135/0
HTSL	A6	JEDEC JESD22-A103	1	45	High Temperature Storage Life	175C	500 Hours	1/77/0	-	1/45/0	1/77/0	-
HTSL	A6	JEDEC JESD22-A103	1	45	High Temperature Storage Life	175C	630 Hours	-	-	-	-	-
Test Group B - Accelerated Lifetime Simulation Tests												
HTOL	B1	JEDEC JESD22-A108	3	77	Life Test	150C	300 Hours	-	-	1/77/0	1/77/0	-
HTOL	B1	JEDEC JESD22-A108	3	77	Life Test	150C	408 Hours	-	3/231/0	1/77/0	1/77/0	-
ELFR	B2	AEC Q100-008	3	800	Early Life Failure Rate	125C	48 Hours	-	3/24000	-	-	-
Test Group C - Package Assembly Integrity Tests												

Type	#	Test Spec	Min Lot Qty	SS / Lot	Test Name	Condition	Duration	Qual Device: LP2901IDRQ1	QBS Package Reference: OPA2991QDGKRQ1	QBS Package, Process Reference: OPA4991QDRQ1	QBS Product Reference: TLV1812QDRQ1	QBS Package, Process Reference: OPA2991QDRQ1
WBS	C1	AEC Q100-001	1	30	Wire Bond Shear	Minimum of 5 devices, 30 wires Cpk>1.67	Wires	1/30/0	-	1/30/0	1/30/0	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	-	1/30/0	1/30/0	3/90/0
SD	C3	JEDEC J-STD-002	1	15	PB Solderability	>95% Lead Coverage	-	1/15/0	-	-	1/15/0	-
SD	C3	JEDEC J-STD-002	1	15	PB-Free Solderability	>95% Lead Coverage	-	1/15/0	-	-	1/15/0	-
PD	C4	JEDEC JESD22-B100 and B108	3	10	Physical Dimensions	Cpk>1.67	-	1/10/0	-	-	1/10/0	3/30/0

Test Group D - Die Fabrication Reliability Tests

EM	D1	JESD61	-	-	Electromigration	-	-	Completed Per Process Technology Requirements	-	-	-	-
TDDb	D2	JESD35	-	-	Time Dependent Dielectric Breakdown	-	-	Completed Per Process Technology Requirements	-	-	-	-
HCI	D3	JESD60 & 28	-	-	Hot Carrier Injection	-	-	Completed Per Process Technology Requirements	-	-	-	-
BTI	D4	-	-	-	Bias Temperature Instability	-	-	Completed Per Process Technology Requirements	-	-	-	-
SM	D5	-	-	-	Stress Migration	-	-	Completed Per Process Technology Requirements	-	-	-	-

Test Group E - Electrical Verification Tests

ESD	E2	AEC Q100-002	1	3	ESD HBM	-	2000 Volts	1/3/0	-	-	-	1/3/0
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Type	#	Test Spec	Min Lot Qty	SS / Lot	Test Name	Condition	Duration	Qual Device: LP2901IDRQ1	QBS Package Reference: OPA2991QDGKRQ1	QBS Package, Process Reference: OPA4991QDRQ1	QBS Product Reference: TLV1812QDRQ1	QBS Package, Process Reference: OPA2991QDRQ1
ESD	E3	AEC Q100-011	1	3	ESD CDM	-	500 Volts	1/3/0	-	-	-	-
LU	E4	AEC Q100-004	1	6	Latch-Up	Per AEC Q100-004	-	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	-	-	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
- QBS: Qual By Similarity
- Qual Device LP2901IDRQ1 is qualified at MSL1 260C

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 J): -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-2311-089

Automotive New Product Qualification Summary (As per AEC-Q100 and JEDEC Guidelines)

Q006 Summary for 0.8 Mil PCC Wire LBC9 AI Bond Pads in MLA (Grade 1, -40/125C)

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: OPA2991QDRQ1	Qual Device: TLV9064QDRQ1
Test Group A – Accelerated Environment Stress Tests									
	PC	A1	-	3	22	SAM Analysis, Pre Stress	Completed	3/66/0	3/66/0
	PC	A1	JEDEC J-STD-020 JESD22-A113	3	77	Preconditioning	Level 1-260C	No fails	No fails
	PC	A1	-	3	22	SAM Analysis, Post Stress	Completed	3/66/0	3/66/0
	HAST	A2	JEDEC JESD22-A110	3	77	Biased HAST, 130C/85%RH	96 Hours	3/231/0	3/231/0
	HAST	A2	JEDEC JESD22-A110	3	70	Biased HAST, 130C/85%RH	192 Hours	3/210/0	3/210/0
	HAST	A2	-	3	1	Cross Section, Post bHAST 192 Hours	Completed	3/3/0	3/3/0
	HAST	A2	-	3	22	SAM Analysis, Post bHAST, 192 Hours	Completed	3/66/0	3/66/0
	HAST	A2	-	3	30	Wire Bond Shear, Post bHAST, 192 Hours	Wires	3/90/0	3/90/0
	HAST	A2	-	3	30	Bond Pull over Stitch, post bHAST, 192 Hours	Wires	3/90/0	3/90/0
	HAST	A2	-	3	30	Bond Pull over Ball, Post bHAST, 192 Hours	Wires	3/90/0	3/90/0
	TC	A4	JEDEC JESD22-A104 and Appendix 3	3	77	Temperature Cycle, - 65/150C	500 Cycles	3/231/0	3/231/0
	TC	A4	JEDEC JESD22-A104 and Appendix 3	3	77	Temperature Cycle, - 65/150C	1000 Cycles	3/210/0	3/210/0
	TC	A4	-	3	1	Cross Section, Post T/C 1000 Cycles	Completed	3/3/0	3/3/0
	TC	A4	-	3	22	SAM Analysis, Post T/C, 1000 Cycles	Completed	3/66/0	3/66/0
	TC	A4	-	3	30	Wire Bond Shear, Post T/C 1000 Cycles	Wires	3/90/0	3/90/0
	TC	A4	-	3	30	Bond Pull over Stitch, Post T/C, 1000 Cycles	Wires	3/90/0	3/90/0
	TC	A4	-	3	30	Bond Pull over Ball, Post T/C, 1000 Cycles	Wires	3/90/0	3/90/0
	PTC	A5	JEDEC JESD22-A105	1	45	Power Temperature Cycle -40/125C	1000 Cycles	N/A	N/A
	PTC	A5	JEDEC JESD22-A105	1	44	Power Temperature Cycle -40/125C	2000 Cycles	N/A	N/A
	HTSL	A6	JEDEC JESD22-A103	3	45	High Temp Storage Bake 150C	1000 Hours	3/135/0	3/135/0

	Type	#	Test Spec	Min Lot Qty	SS/Lot	Test Name / Condition	Duration	Qual Device: OPA2991QDRQ1	Qual Device: TLV9064QDRQ1
	HTSL	A6	JEDEC JESD22-A103	3	44	High Temp Storage Bake 150C	2000 Hours	3/132/0	3/132/0
	HTSL	A6	-	3	1	Cross Section, Post HTSL 2000 Hours	Completed	3/3/0	3/3/0
Test Group C – Package Assembly Integrity Tests									
	WBS	C1	AEC Q100-001	3	30	Wire Bond Shear, Cpk>1.67	Wires	3/90/0	3/90/0
	WBP	C2	MIL-STD883 Method 2011	3	30	Bond Pull over Ball, Cpk >1.67	Wires	3/90/0	3/90/0

IMPORTANT NOTICE AND DISCLAIMER

- QBS: Qual By Similarity
- Qual Device TLV9064QDRQ1 is qualified at MSL2 260C
- Qual Device OPA2991QDRQ1Q is qualified at MSL1 260C
-

A1 (PC): Preconditioning:

Performed for THB, Biased HAST, AC, uHAST & TC samples, as applicable.

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

Green/Pb-free Status:

Qualified Pb-Free(SMT) and Green

TI Qualification ID: 20201209-137461

ZVEI ID's: SEM-DE-01, SEM-DE-02, SEM-DE-03, SEM-PW-02, SEM-PW-09, SEM-PW-13, SEM-PA-08, SEM-PA-18, SEM-PA-14, SEM-TF-01

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

Texas Instruments Incorporated

TI Information - Selective Disclosure

PCN# 20231219020.2

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