

PCN Number:	20210202001B.2		PCN Date:	June 23, 2021	
Title:	Qualify UMC-F12A for C021.A Process as alternate source				
Customer Contact:	PCN Manager		Dept:	Quality Services	
Proposed 1st Ship Date:	August 9, 2021	Estimated Sample Availability:	Date provided at sample request		
Change Type:					
<input type="checkbox"/>	Assembly Site	<input type="checkbox"/>	Design	<input type="checkbox"/>	Wafer Bump Site
<input type="checkbox"/>	Assembly Process	<input type="checkbox"/>	Data Sheet	<input type="checkbox"/>	Wafer Bump Material
<input type="checkbox"/>	Assembly Materials	<input type="checkbox"/>	Part number change	<input type="checkbox"/>	Wafer Bump Process
<input type="checkbox"/>	Mechanical Specification	<input type="checkbox"/>	Test Site	<input checked="" type="checkbox"/>	Wafer Fab Site
<input type="checkbox"/>	Packing/Shipping/Labeling	<input type="checkbox"/>	Test Process	<input checked="" type="checkbox"/>	Wafer Fab Materials
		<input type="checkbox"/>		<input type="checkbox"/>	Wafer Fab Process
PCN Details					
Description of Change:					
Texas Instruments Incorporated is announcing the qualification of Wafer Fab site UMC-F12A in the C021.A process as an alternate source.					
The purpose of Addendum B is to include additional part numbers as highlighted under Product Affected section on page 4.					
Proposed 1 st Ship Date for the new devices will be 180 days from this notice (Dec. 23, 2021). The Proposed 1 st Ship Date of Aug 9, 2021 still applies for the original set of devices.					
Current Fab Site			Alternate Fab Site		
Current Fab Site	Process	Wafer Diameter	New Fab Site	Process	Wafer Diameter
DMOS6	C021.A	300 mm	UMC-F12A	C021.A	300 mm
Process Difference Summary					
Description	Current Fab		New Fab		
Wafer Fab Site	DM6		UMC12A		
Dielectric Material	SiCN/TEOS/LK SiOC (Stack effective k value = 3.1)		SiCN/LK SiOC (Stack effective k value = 3.1)		
Top protective layer or Passivation layer material	PO Oxide (TEOS/SiON)		TEOS/SiN		
Reason for Change:					
Continuity of Supply.					
Anticipated impact on Fit, Form, Function, Quality or Reliability (positive / negative):					
None.					
Changes to product identification resulting from this PCN:					
Current:					
Current Chip Site	Chip Site Origin Code (20L)	Chip Site Country Code (21L)	Chip Site City		
DMOS6	DM6	USA	Dallas		
New Fab Site:					
New Chip Site	Chip Site Origin Code (20L)	Chip Site Country Code (21L)	Chip Site City		
UMC-F12A	F12	TWN	Tainan		

Sample Product Shipping Label (not actual product label)

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

 **G4**



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) 0033317
(20L) CSO: SHE (21L) CCO:USA
(22L) ASO: MLA (23L) ACO: MYS

Product Affected:

DS90UB936TRGZRQ1
DS90UB936TRGZTQ1
DS90UB954TRGZRQ1
DS90UB954TRGZTQ1
DS90UB958TRGZRQ1
DS90UB958TRGZTQ1
DS90UB960WRTDRQ1
DS90UB960WRTDTQ1
DS90UB962WRTDRQ1
DS90UB962WRTDTQ1

DS90UB934TRGZRQ1 <- See Qualification report on page 8.

DS90UB934TRGZTQ1 <- See Qualification report on page 8.

Automotive New Product Qualification Summary

(As per AEC-Q100 and JEDEC Guidelines)

**Approved 27-Jan-2021
Product Attributes**

Attributes	Qual Device: DS90UB960WRTD	Qual Device: DS90UB954TRGZTQ 1	QBS Process Reference: DS90UB964TRGCRQ1	QBS Reference: DS90UB960WRTDRQ1	QBS Reference: DS90UH949TRGCRQ1
Automotive Grade Level	Grade 2	Grade 2	Grade 2	Grade 2	Grade 2
Operating Temp Range	-40 to +105 C	-40 to +105 C	-40 to +105 C	-40 to +105 C	-40 to +105 C
Product Function	Signal Chain	-	Interface	Signal Chain	Signal Chain
Die Attributes --					
Wafer Fab Supplier	UMC-12A	UMC-12A	UMC-12A	DMOS6	DMOS6
Wafer Diameter (mm)	300	300	300	300	300
Wafer Process ID	1118C021.A6	1118C021.A6	1118C021.A6	1118C021.A6	1118C021.A6
Wafer Process Technology	C021	C021	C021.	C021	C021
Package Attributes--					
Assembly Site	AP1	CLARK-AT	CLARK AT	AP1	CLARK AT
Package Type	VQFN	VQFN	VQFN	VQFN	VQFN
Package Designator	RTD	RGZ	RGC	RTD	RGC
Ball/Lead Count	64	48	64	64	64
Package Size (mils)	354.33 X 354.33	275.59 X 275.59	354.33 X 354.33	354.33 X 354.33	354.33 X 354.33
Body Thickness (mils)	39.37	35.43	39.37	39.37	39.37

- QBS: Qual By Similarity
- Qual Devices qualified at LEVEL3-260C: DS90UB960WRTD
- Qual Devices qualified at LEVEL3-260C: DS90UB954TRGZ

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: DS90UB860WRTD RQ1	Qual Device: DS90UB854TRGZ TQ1	QBS Process Reference: DS90UB964TRGC RQ1	QBS Reference: DS90UB960WRTD RQ1	QBS Reference: DS90UH949TRGC RQ1
Test Group A – Accelerated Environment Stress Tests											
PC	A 1	JEDEC J-STD-020 JESD2 2-A113	3	77	Automotive Preconditioning	Level 3-260C	-	-	3/Pass	2/Pass	1/Pass
HAST	A 2	JEDEC JESD2 2-A110	3	77	Biased HAST, 110C/85%RH	528 Hours	-	-	3/231/0	-	-
HAST	A 2	JEDEC JESD2 2-A110	3	77	Biased HAST, 130C/85%RH	96 Hours	-	-	-	2/154/0	1/77/0
HAST	A 2	JEDEC JESD2 2-A110	3	77	Biased HAST, 130C/85%RH	192 Hours	-	-	-	2/154/0	1/77/0
AC	A 3	JEDEC JESD2 2-A102	3	77	Autoclave 121C	96 Hours	-	-	-	2/154/0	1/77/0
AC	A 3	JEDEC JESD2 2-A102	3	77	Autoclave 121C	192 Hours	-	-	-	2/154/0	1/77/0
UHAST	A 3	JEDEC JESD2 2-A118	3	77	Unbiased HAST, 110C/85%RH	264 Hours	-	-	3/231/0	-	-
TC	A 4	JEDEC JESD2 2-A104 and Appendix 3	3	77	Temperature Cycle, -65/150C	500 Cycles	-	-	3/231/0	2/154/0	1/77/0
TC	A 4	JEDEC JESD2 2-A104 and Appendix 3	3	77	Temperature Cycle, -65/150C	1000 Cycles	-	-	3/219/0	2/154/0	1/77/0
TC-BP	A 4	JEDEC JESD2 2-A104 and Appendix 3	3	77	Post Temp. Cycle - Bond Pull	Wires	-	-	1/30/0	1/3/0	-
PTC	A 5	JEDEC JESD2 2-A105	1	45	Power Temperature Cycle	1000 Cycles	N/A	N/A	NA	NA	NA
HTSL	A 6	JEDEC JESD2 2-A103	1	45	High Temp Storage Bake 150C	1000 Hours	-	-	-	2/90/0	1/45/0
HTSL	A 6	JEDEC JESD2 2-A103	1	45	High Temp Storage Bake 150C	20000 hrs.	-	-	1/45/0	2/90/0	1/45/0
Test Group B – Accelerated Lifetime Simulation Tests											
HTOL	B 1	JEDEC JESD2 2-A108	3	77	Life Test, 125	1000 Hours	-	1/77/1 (Note 1)	3/231/0	3/231/0	-
ELFR	B 2	AEC Q100-008	3	80	Early Life Failure Rate, 125C	24 Hours	-	-	3/2400/0	-	-
EDR	B 3	AEC Q100-005	3	77	NVM Endurance, Data Retention, and Operational Life	--	N/A	N/A	N/A	N/A	N/A
Test Group C – Package Assembly Integrity Tests											
WBS	C 1	AEC Q100-001	1	30	Bond Shear (Cpk>1.67)	Wires	1/30/0	1/30/0	1/30/0	3/90/0	-
WBP	C 2	MIL-STD883 Method 2011	1	30	Bond Pull (Cpk>1.67)	Wires	1/30/0	1/30/0	1/30/0	3/90/0	-
SD	C 3	JEDEC JESD2 2-B102	1	15	Surface Mount Solderability >95% Lead Coverage	8 Hours Steam Age	-	-	-	3/90/0	-
SD	C 3	JEDEC JESD2 2-B102	1	15	Surface Mount Solderability >95% Lead Coverage	8 Hours Steam Age	-	-	-	3/90/0	-
PD	C 4	JEDEC JESD2 2-B100 and B108	3	10	Physical Dimensions (Cpk>1.67)	--	-	-	3/90/0	3/90/0	-

and B108											
Test Group D – Die Fabrication Reliability Tests											
EM	D 1	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
Tddb	D 2	JESD35	-	-	Time Dependant 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
HCI	D 3	JESD60 & 28	-	-	Hot Injection Carrier	--	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
NBTI	D 4	-	-	-	Negative 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
SM	D 5	-	-	-	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
Test Group E – Electrical Verification Tests											
HBM	E 2	AEC Q100-002	1	3	ESD – HBM Pins RIN0+, RIN0-, RIN1+, RIN1-, RIN2+, RIN2-, RIN3+, RIN3-	6000 V	1/3/0	-	-	-	-
HBM	E 2	AEC Q100-002	1	3	ESD – HBM Other Pins	3000 V	1/3/0	-	1/3/0	1/3/0	1/3/0
HBM	E 2	AEC Q100-002	1	3	ESD – HBM Pins 32, 33, 41 and 42	8000 V	-	1/3/0	-	-	-
HBM	E 2	AEC Q100-002	1	3	ESD – HBM Other Pins	4500 V	-	1/3/0	-	-	-
CDM	E 3	AEC Q100-011	1	3	ESD - CDM	1000 V	1/3/0	-	1/3/0	1/3/0	1/3/0
CDM	E 3	AEC Q100-011	1	3	ESD - CDM	1250 V	-	1/3/0	-	-	-
LU	E 4	AEC Q100-004	1	6	Latch-up	(Per AEC Q100-004)	1/6/0	1/6/0	1/6/0	1/6/0	1/6/0
ED	E 5	AEC Q100-009	3	30	Auto Electrical Distributions	Cpk > 1.67	3/90/0	3/90/0	3/90/0	3/90/0	3/90/0

A1 (PC): Preconditioning:

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

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

Note 1: 1 unit failed at the 1000 hour readpoint for leakage on a testpin and remained fully functional. Attributed to depressed wire that is not related to offload. FA and 8D attached to eQDB.

Automotive New Product Qualification Summary

(As per AEC-Q100 and JEDEC Guidelines)

Approved 18-May-2021

Product Attributes

Attributes	Qual Device: DS90UB934TRGZRQ1	QBS Process Reference: DS90UB964TRGCRQ1	QBS Product and Package Reference: DS90UB934TRGZ
Automotive Grade Level	Grade 2	Grade 2	Grade 2
Operating Temp Range	-40 to +105 C	-40 to +105 C	-40 to +105 C
Wafer Fab Site	UMC-12A	UMC-12A	DMOS6
Die Revision	A0	A1	A0
Assembly Site	CLARK-AT	CLARK AT	CLARK-AT
Package Type	VQFN	VQFN	VQFN
Package Designator	RGZ	RGC	RGZ
Ball/Lead Count	48	64	48

- QBS: Qual By Similarity

- Qual Devices qualified at LEVEL3-260C: DS90UB934TRGZRQ1

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: DS90UB934TRGZRQ 1	QBS Process and Package Reference: DS90UB964TRGCRQ1	QBS Product Reference: DS90UB934TRGZ
Test Group A – Accelerated Environment Stress Tests									
PC	A1	JEDEC J-STD-020 JESD22-A113	3	77	Automotive Preconditioning	Level 3-260C	-	3/Pass	1/Pass
HAST	A2	JEDEC JESD22-A110	3	77	Biased HAST, 110C/85%RH	528 Hours	-	3/231/0	-
HAST	A2	JEDEC JESD22-A110	3	77	Biased HAST, 130C/85%RH	96 Hours	-	-	1/77/0
HAST	A2	JEDEC JESD22-A110	3	77	Biased HAST, 130C/85%RH	192 Hours	-	-	-
AC	A3	JEDEC JESD22-A102	3	77	Autoclave 121C	192 Hours	-	-	-
UHAST	A3	JEDEC JESD22-A118	3	77	Unbiased HAST, 110C/85%RH	264 Hours	-	3/231/0	-
UHAST	A3	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, -65/150C	500 Cycles	-	3/231/0	1/77/0
TC	A4	JEDEC JESD22-A104 and Appendix 3	3	77	Temperature Cycle, -65/150C	1000 Cycles	-	3/219/0	-
TC-BP	A4	JEDEC JESD22-A104 and Appendix 3	3	77	Post Temp. Cycle, Bond Pull	Wires	-	1/30/0	-
PTC	A5	JEDEC JESD22-A105	1	45	Power Temperature Cycle	1000 Cycles	N/A	NA	N/A
HTSL	A6	JEDEC JESD22-A103	1	45	High Temp Storage Bake 150C	500 Hours	-	-	1/45/0
HTSL	A6	JEDEC JESD22-A103	1	45	High Temp Storage Bake 150C	1000 Hours	-	1/45/0	-

Test Group B – Accelerated Lifetime Simulation Tests									
HTOL	B1	JEDEC JESD22-A108	3	77	Life Test, 125	1000 Hours	-	3/231/0	3/231/0
ELFR	B2	AEC Q100-008	3	800	Early Life Failure Rate, 125C	24 Hours	-	3/2400/0	-
EDR	B3	AEC Q100-005	3	77	NVM Endurance, Data Retention, and Operational Life	--	N/A	N/A	N/A
Test Group C – Package Assembly Integrity Tests									
WBS	C1	AEC Q100-001	1	30	Bond Shear (Cpk>1.67)	Wires	1/30/0	1/30/0	-
WBP	C2	MIL-STD883 Method 2011	1	30	Bond Pull (Cpk>1.67)	Wires	1/30/0	1/30/0	-
SD	C3	JEDEC JESD22-B102	1	15	Surface Mount Solderability >95% Lead Coverage	8 Hours Steam Age	-	-	-
SD	C3	JEDEC JESD22-B102	1	15	Surface Mount Solderability >95% Lead Coverage	8 Hours Steam Age	-	-	-
PD	C4	JEDEC JESD22-B100 and B108	3	10	Physical Dimensions (Cpk>1.67)	--	-	3/90/0	-
Test Group D – Die Fabrication Reliability Tests									
EM	D1	JESD61	-	-	Electromigration	--	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements
TDDDB	D2	JESD35	-	-	Time Dependant Dielectric Breakdown	--	Completed Per Process Technology Requirements	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	Completed Per Process Technology Requirements
NBTI	D4	-	-	-	Negative Bias Temperature Instability	--	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
Test Group E – Electrical Verification Tests									
HBM	E2	AEC Q100-002	1	3	ESD - HBM	2000 V	1/3/0	1/3/0	1/3/0
CDM	E3	AEC Q100-011	1	3	ESD - CDM	750 V	1/3/0	1/3/0	1/3/0
LU	E4	AEC Q100-004	1	6	Latch-up, 25C	(Per AEC Q100-004)	1/6/0	1/6/0	1/6/0
LU	E4	AEC Q100-004	1	6	Latch-up, 105C	(Per AEC Q100-004)	1/6/0	1/6/0	1/6/0
ED	E5	AEC Q100-009	3	30	Auto Electrical Distributions	Cpk>1.67	3/90/0	3/90/0	3/90/0

A1 (PC): Preconditioning:

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

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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

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