



## Final Product Change Notification

202310005F01 : S12ZVM(L)31/32/16 FAB SITE EXPANSION (NXP-ATMC to TSMC10)

**Note:** This notice is NXP Company Proprietary.

**Issue Date:** Nov 30, 2023

**Effective Date:** Feb 28, 2024

### Change Category

- |  |  |  |   |   |
|--|--|--|---|---|
| <input type="checkbox"/> Wafer Fab Process             | <input type="checkbox"/> Assembly Process  | <input type="checkbox"/> Product Marking           | <input type="checkbox"/> Test Process   | <input type="checkbox"/> Design                         |
| <input type="checkbox"/> Wafer Fab Materials           | <input type="checkbox"/> Assembly Materials  | <input type="checkbox"/> Mechanical Specification  | <input type="checkbox"/> Test Equipment | <input checked="" type="checkbox"/> Errata              |
| <input checked="" type="checkbox"/> Wafer Fab Location | <input type="checkbox"/> Assembly Location   | <input type="checkbox"/> Packing/Shipping/Labeling | <input type="checkbox"/> Test Location  | <input type="checkbox"/> Electrical spec./Test coverage |
| <input type="checkbox"/> Firmware                      | <input checked="" type="checkbox"/> Other: Reference Manual and Datasheet update to include TSMC10 mask set information. |  |   |   |

## PCN Overview

### Description

NXP Semiconductors is announcing the introduction of Taiwan Semiconductor Manufacturing Company Fab 10 (TSMC10), Shanghai, China as a dual source wafer manufacturing location for the S12ZVM(L)31/32/16.

NXP Semiconductors requires the use of flex part numbers to maximize supply continuity. Without the use of flex part numbers, backlog will have to be converted from one fab sourced device to another fab sourced device as capacity dictates.

The Reference Manual and Datasheet for S12ZVM(L)31/32/16 has been updated to add the TSMC10 mask set (0P33K) in section 1.6.2, Part ID Assignments, and the Part Ordering Information's mask set identifier suffix.

The Errata document has also been updated to include TSMC mask set (0P33K).

The S12ZVM(L)31/32/16 Reference Manual and Datasheet and Errata are attached with this notification or can be found at <https://www.nxp.com/products/processors-and-microcontrollers/additional-mpu-mcus-architectures/s12-magniv-mixed-signal-mcus/s12zvm-mixed-signal-mcu-for-automotive-and-industrial-motor-control-applications:S12ZVM>

Corresponding ZVEI Delta Qualification Matrix ID: SEM-DS-02, SEM-PW-08, SEM-PW-13

### Reason

The fab manufacturing site capacity expansion to TSMC10 will improve NXP's ability to meet increasing customer demand and still maintain supply from the original fab (NXP-ATMC).

### Identification of Affected Products

Top Side Marking

The mask marking for TSMC10 will reflect P33K, while the mask marking for ATMC will remain N14N.

## Product Availability

### Sample Information

Samples are available from Dec 01, 2023

Please see the attachment "S12ZVM(L)31/32/16\_ATMC to TSMC10 Fab Expansion\_FPCN\_Supplement" file for sample part numbers available for ordering.

### Production

Planned first shipment Mar 01, 2024

## Anticipated Impact on Form, Fit, Function, Reliability or Quality

No Impact on form, fit, function, reliability or quality

### Data Sheet Revision

A new datasheet will be issued

### Disposition of Old Products

Fab Expansion. No depletion of inventory required.

## Timing and Logistics

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In compliance with JEDEC J-STD-046, your acknowledgement of this change is expected by Dec 30, 2023.

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NXP Quality Management Team.

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# **S12ZVM(L)31/ 32/ 16 (OBIDOS) ATMC VS TSMC10 CAPACITY EXPANSION PCN 202310005F01**

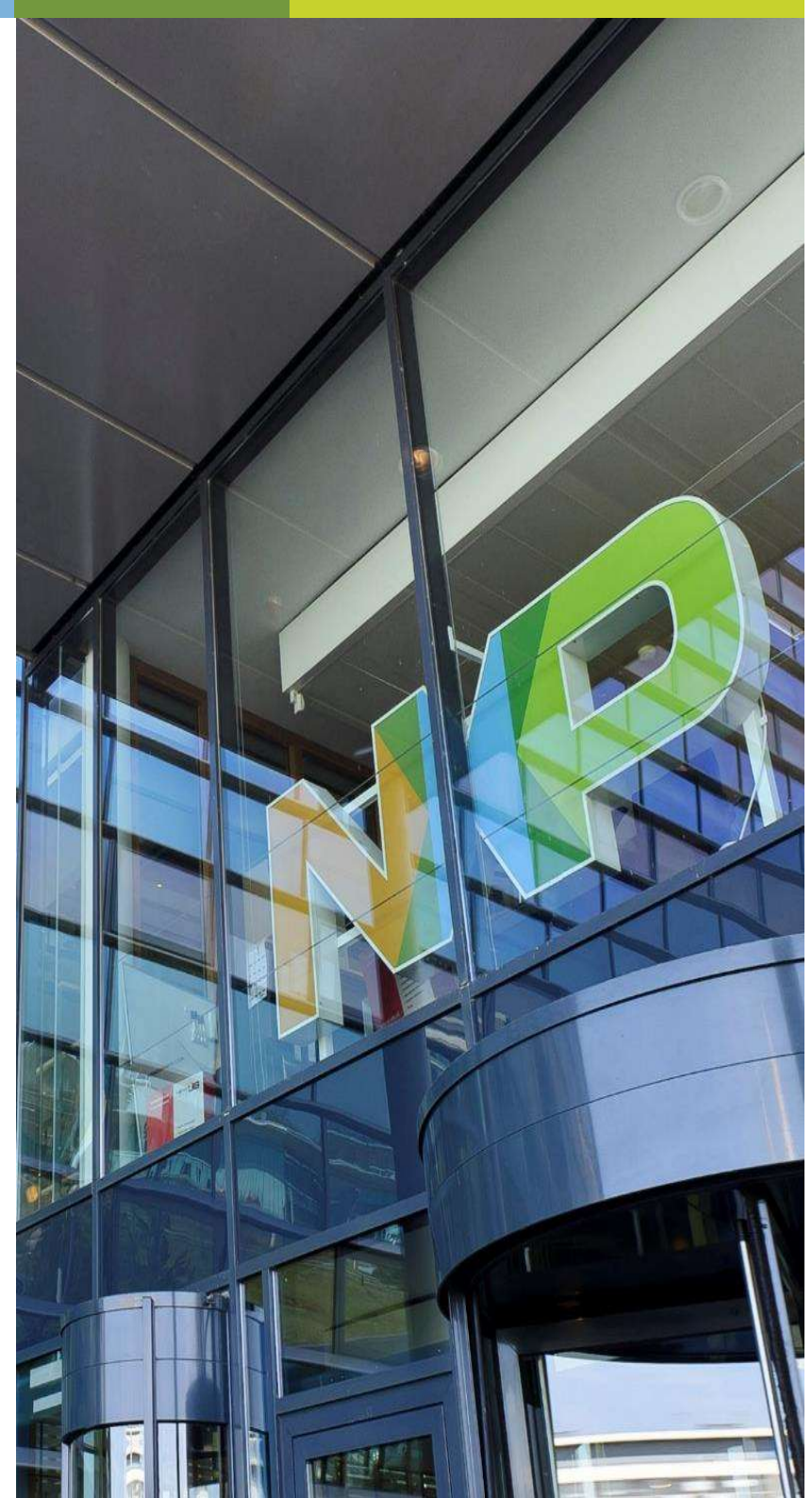
Shan Li  
NOVEMBER 2023



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EXTERNAL

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# 180NM UHV WAFER CAPACITY EXPANSION

- Consistent with NXP's previous communications and in alignment with our policy of providing flexible sourcing and supply assurance, NXP qualified OBIDOS (180nm UHV wafer technology) at Taiwan Semiconductor Manufacturing Company Fab 10 (TSMC10), Shanghai, China in Q4 2023.
- NXP requires the use of Flex part numbers to maximize supply continuity and provide best possible lead time.
- Without the use of Flex part numbers, backlog will have to be converted from one fab sourced device to another fab sourced device as capacity dictates.
  - Carcassonne was the first MagniV product to be dual qualified, ATMC / TSMC10 in Q3 2020
  - Knox128 and Tomar3 completed dual qualification, ATMC / TSMC10 in Q1 2021.
  - Knox32 and Hearst completed dual qualification, ATMC / TSMC10 in Q2 2021.

# TSMC10 OVERVIEW

- High volume, 200mm fab F10-TSMC located in Shanghai, China
  - Fab Area: 24,000m
  - Low defectivity, high volume Accumulative 10M Wafer Out
  - Monthly capacity 130K wfr/month
  - follows the same quality system as tsmc cooperate HQ
- Production Status
  - >50 customers, >250 products, >1 million accumulated wafers
- Comprehensive Solution 0.5um~0.11um technology
  - 3.3V or 5V I/O
  - High endurance or low leakage devices
- Automotive grade certified
  - Grade1 18HDR since 2014
  - ISO/IATF16949 since 2017
  - 13 technology. Qualified on Grade 1; 23 products from 7 customers
- NXP-Fab10 business engagement



# SUMMARY OF CHANGES

Process Step	Changes	Details
Wafer Fab	<ul style="list-style-type: none"> <li>TSMC10 becomes a dual wafer source</li> </ul>	<ul style="list-style-type: none"> <li>Process electrical characteristics matched</li> <li>No Data Sheet specification changes</li> </ul>
Design	<ul style="list-style-type: none"> <li>No Design changes</li> </ul>	<ul style="list-style-type: none"> <li>No Design changes</li> </ul>
Packaging	<ul style="list-style-type: none"> <li>Packages qualified with same Build of Material</li> </ul>	<ul style="list-style-type: none"> <li>No difference in product performance</li> </ul>
Marking	<ul style="list-style-type: none"> <li>Mask # is marked on product so that customers can visually distinguish ATMC or TSMC10.</li> </ul>	<ul style="list-style-type: none"> <li>Slide #5 provides marking details</li> </ul>
Test	<ul style="list-style-type: none"> <li>No Change to Test Flow, Specification or Quality</li> </ul>	<ul style="list-style-type: none"> <li>No difference in product performance</li> <li>Electrical Distributions (ED) comparison, ATMC vs TSMC, included in PCN</li> </ul>
Reliability	<ul style="list-style-type: none"> <li>Passed AECQ100 qualification</li> </ul>	<ul style="list-style-type: none"> <li>Qualification Report available within PCN</li> </ul>
Orderable Part Numbers	<ul style="list-style-type: none"> <li>Required conversion to “Flex” part number for supply assurance</li> </ul>	<ul style="list-style-type: none"> <li>Slide #5 provides part number details</li> </ul>



# CHANGES WITHIN THE AEC Q100 CERTIFICATION OF DESIGN, CONSTRUCTION AND QUALIFICATION (COFDC)

AEC Q100 Certification of Design, Construction and Qualification AEC Q100 -RevH			
		Date: 26-Apr-17/ 23 June 2021	Date: 24-Oct-2023
	Item Name	NXP Response	NXP Response
1.	Customer Part Number:	Not Applicable	Not Applicable
		Grade 0: S912ZVM32F1WKH S912ZVML31F1WKH S912ZVM16F1WKH	Grade 0: S912ZVM32L0WKH S912ZVML31L0WKH S912ZVM16L0WKH
2.	NXP Part Number/Data Sheet:	Grade 1/ Grade 2: S912ZVM32F1MKH / S912ZVM32F1VKH S912ZVM16F1MKH / S912ZVM16F1VKH S912ZVML31F1MKH / S912ZVML31F1VKH S912ZVML31F1MKH  *Flex part numbers will have fab site nomenclature in bold replaced with the letter "A".	Grade1/ Grade2: S912ZVM32L0MKH / S912ZVM32L0VKH S912ZVM16L0MKH / S912ZVM16L0VKH S912ZVML31L0MKH / S912ZVML31L0VKH S912ZVML31L0MKH  *Flex part numbers will have fab site nomenclature in bold replaced with the letter "A".
3.	Device Description:	Automotive 16-bit S12Z core. Using LL18UHV process	Automotive 16-bit S12Z core. Using LL18UHV process
4.	Wafer/Die Fab Facility & Process ID:		
	a. Facility name/plant #:	NXP-ATMC	FSMC10
	b. Street address:	3501 Ed Bluestein Boulevard; Austin, TX 78721	4000, Wen Xiang Road, Songjiang, Shanghai, Postcode: 201616
	c. Country:	USA	China
8.	Wafer/Die:		
	a. Wafer Size:	200mm	200mm
	b. Die family:	S12Z	S12Z
	c. Die mask set revision & name:	IN14N	0P33K
	d. Die photo:	Confidential & Proprietary	Confidential & Proprietary
9.	Die Technology Description:		
	a. Wafer/Die process technology:	E018	E018
	b. Die channel length (μM):	0.18um	0.18um
	c. Die gate length (μM):	0.18um	0.18um
	d. Die supplier process ID (mask #):	N14N	P33K
	e. Number of transistors or gates:	137746	137746
	f. Number of mask steps:	37	37
11.	Die Metallization:		
	a. Die metallization materials:	Al (0.5 wt%Cu)	Al(0.5 wt%Cu)
	b. Number of layers:	5	5
	c. Thickness (per layer):	M1~4: 4 kA, M5: 8kA	M1~4: 4 kA, M5: 8kA
	d. % of alloys (if present):	99.5% Al/0.5% Cu	99.5% Al/0.5% Cu
12.	Die Passivation:		
	a. Number of passivation layers:	3	3
	b. Die passivation material(s):	10K HDP / 1.5K SION + 6K PEN P1. 10KA +/- 10%	10K HDP / 1.5K SION + 6K PEN P1. 10KA +/- 10%
	c. Thickness (es) & tolerances:	P2. 1.5KA +/- 10% P3. 6KA +/- 10%	P2. 1.5KA +/- 10% P3. 6KA +/- 10%


# S12ZVM(L)31/ 32/ 16 (OBIDOS) ORDERABLE PART NUMBER AND MARKING


Required

ATMC PNs	TSMC10 PNs	Flex PNs	
S912ZVM <u>d</u> <u>ff</u> F1 <u>t</u> <u>pp</u> / R	S912ZVM <u>d</u> <u>ff</u> L0 <u>t</u> <u>pp</u> / R	S912ZVM <u>d</u> <u>ff</u> A <u>t</u> <u>pp</u> / R	<u>d</u> = L for LINPHY <u>ff</u> = Flash memory size 32 = 32Kb, 31 = 32Kb, 16 = 16Kb <u>t</u> = Temp range (W, M, V, C): min -40C to W = 150C, M = 125C, V = 105C, C = 85C <u>pp</u> = package; KH = 64LQFP-EP KF = 48LQFP-EP
F = ATMC 1 = Rev 1	L = TSMC10 0 = Rev 0	(No wafer fab designator) A = ATMC Rev 1 /TSMC10 Rev0	



# S12ZVM(L)31/16 (OBIDOS) ORDER PART NUMBERS AND MARKING

Marking (64LQFP)		ATMC	TSMC10	
Line 1	Logo			
Line 2	Base Part No.	S912ZVM <u>d</u> <u>ff</u>		
Line 3	Mask#	<u>t</u> <u>pp</u> 1N14N	<u>t</u> <u>pp</u> 0P33K	
Line 4	Trace code	AWLYYWWZ		A =Assembly site WL =Lot ID YY =Year; WW=week Z =Sub lot

Marking (48LQFP)		ATMC	TSMC10	
Line 1	Logo	 S912		
Line 2	Base Part No.	ZVM <u>d</u> <u>ff</u> <u>t</u>		
Line 3	Mask#	1N14N	0P33K	
Line 4	Trace code	AWLYYWWZ		A =Assembly site WL =Lot ID YY =Year; WW=week Z =Sub lot

# S12ZVM(L)31/16 (OBIDOS) ORDER PART NUMBERS AND MARKING

- How to distinguish between the ATMC / TSMC10 / Flex marking?

ATMC:

```
-----  
!           !  
! (Logo)   !  
!S912ZVML31 !  
!WKH  1N14N !  
! AWLYYWWZ !  
!         !  
!         !  
! * _____ !
```

Flex (ATMC or TSMC10):

```
-----  
!           !  
! (Logo)   !  
!S912ZVML31 !  
!WKH  1N14N or 0P33K !  
! AWLYYWWZ !  
!         !  
!         !  
! * _____ !
```

TSMC10:

```
-----  
!           !  
! (Logo)   !  
!S912ZVML31 !  
!WKH  0P33K !  
! AWLYYWWZ !  
!         !  
!         !  
! * _____ !
```

LQFP64

```
-----  
!           !  
! (Logo)S912 !  
!  ZVML31M  !  
!  1N14N   !  
!  ALYWZ    !  
!         !  
!         !  
! * _____ !
```

```
-----  
!           !  
! (Logo)S912 !  
!  ZVML31M  !  
! 1N14N or 0P33K !  
!  ALYWZ    !  
!         !  
!         !  
! * _____ !
```

```
-----  
!           !  
! (Logo)S912 !  
!  ZVML31M  !  
!  0P33K   !  
!  ALYWZ    !  
!         !  
!         !  
! * _____ !
```

LQFP48

# TSMC10 PART ID

## 1.6.2 Part ID Assignments

The part ID is located in four 8-bit registers at addresses 0x0000-0x0003. The read-only value is a unique part ID for each revision of the chip. Table 1-6 shows the assigned part ID number and mask set number. The shaded part ID numbers are not production mask sets.

Table 1-6. Assigned Part ID Numbers

Device	Mask Set Number	Part ID	Option
MC9S12ZVMC256	0N00R	0x00180000	CAN
MC9S12ZVMC256	1N00R	0x00180100	CAN
MC9S12ZVML12	N06E	0x00170000	LIN
MC9S12ZVMC12	N06E	0x00170001	CAN-VREG
MC9S12ZVML12	0N95G	0x00172000	LIN
MC9S12ZVMC12	0N95G	0x00172001	CAN-VREG
MC9S12ZVML12	1N95G	0x00172100	LIN
MC9S12ZVML64	1N95G	0x00172100	LIN
MC9S12ZVML32	1N95G	0x00172100	LIN
MC9S12ZVMC12	1N95G	0x00172101	CAN-VREG
MC9S12ZVMC64	1N95G	0x00172101	CAN-VREG
MC9S12ZVML12	2N95G	0x00172200	LIN
MC9S12ZVML64	2N95G	0x00172200	LIN
MC9S12ZVML32	2N95G	0x00172200	LIN
MC9S12ZVMC12	2N95G	0x00172201	CAN-VREG
MC9S12ZVMC64	2N95G	0x00172201	CAN-VREG
MC9S12ZVML12	3N95G	0x00172300	LIN
	0P58A		
MC9S12ZVML64	3N95G	0x00172300	LIN
	0P58A		
MC9S12ZVML32	3N95G	0x00172300	LIN
	0P58A		
MC9S12ZVMC12	3N95G	0x00172301	CAN-VREG
	0P58A		
MC9S12ZVMC64	3N95G	0x00172301	CAN-VREG
	0P58A		
MC9S12ZVML31	0N14N	0x00150000	LIN
MC9S12ZVM32	0N14N	0x00150000	HV Physical Interface
MC9S12ZVM16	0N14N	0x00150000	HV Physical Interface
MC9S12ZVML31	1N14N	0x00150100	LIN
	0P33K		
MC9S12ZVM32	1N14N	0x00150100	HV Physical Interface
	0P33K		
MC9S12ZVM16	1N14N	0x00150100	HV Physical Interface
	0P33K		

- TSMC10 mask set 0P33K and ATMC mask set 1N14N use the same Part ID.
- No other register difference between the two Fabs.
- TSMC10 mask set 0P33K is included in the updated Reference Manual and Datasheet.

## S12ZVM(L)31/16 TSMC10 EXPANSION - SAMPLE PART NUMBER/ ORDERABLE FLEX PART NUMBER

Table below provides TSMC10 sample part numbers and equivalent flex orderable part numbers:

Current ATMC Qualified Orderable Part Number	Equivalent TSMC10 Qualified Sample Part Number	Equivalent Flex Qualified Orderable Part Number	Package
S912ZVML31F1MKF	K912ZVML31L0MKF	S912ZVML31AMKF	48LQFP-EP 7*7
S912ZVML31F1MKFR	K912ZVML31L0MKFR	S912ZVML31AMKFR	48LQFP-EP 7*7
S912ZVML31F1WKF	K912ZVML31L0WKF	S912ZVML31AWKF	48LQFP-EP 7*7
S912ZVML31F1WKFR	K912ZVML31L0WKFR	S912ZVML31AWKFR	48LQFP-EP 7*7
S912ZVM16F1MKH	K912ZVM16L0MKH	S912ZVM16AMKH	64LQFP-EP 10*10
S912ZVML31F1MKHR	K912ZVML31L0MKHR	S912ZVML31AMKHR	64LQFP-EP 10*10
S912ZVML31F1WKH	K912ZVML31L0WKH	S912ZVML31AWKH	64LQFP-EP 10*10
S912ZVML31F1WKHR	K912ZVML31L0WKHR	S912ZVML31AWKHR	64LQFP-EP 10*10



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