

## Process Change Notification

This is to inform you that a design and/or process change will be implemented to the affected product(s) listed below. This notification requires your concurrence within 45 days upon receipt of this notification.

The plan change/s will take effect 90 calendar days from the date of this notification.

Please work with your local Taiwan Semiconductor Sales Representative to manage your inventory of unchanged/ existing product if your evaluation of this change will require more than 90 calendar days.

Please contact your local Taiwan Semiconductor Field Quality Service or Customer Quality Engineer within 45 days of receipt of this notification if you require any additional data or samples.

**Change No: PCN23008 rev0**

**Title:** PDFN56U Additional Assembly and Test Site Qualification

**Issue Date: 2023/8/7**

If you have any questions concerning this change, please contact:

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**Change Type:** Additional Assembly and Test Site

**Effectivity:**

Expected 1st device shipment date : 2023/11/5

**Product Category (Description):**

MOSFET TQM NB series from PDFN56U that are currently assembled and tested in Supplier 3864 located in Shanghai, China.

**Description of Change:**

Taiwan Semiconductor Company will qualify its ILAN Facility for MOSFET, PDFN56U package as additional assembly and test site. This change to add supplier or manufacturing site will improve flexibility on supply chain. This change will guarantee Taiwan Semiconductor commitment on customer service and satisfaction through continuous improvement.

Identification and traceability by product marking (factory code).

Molding compound used on the additional assembly and test site is different but no impact on the product specification, form, fit and function.

**Bill of Materials Comparison**

Item	Current	Additional	Remarks
Assembly and Test Site	Supplier 3864	Taiwan Semiconductor ILAN Facility	Additional Assembly and Test Site
MOSFET Wafer	Supplier 4581	Supplier 4581	Same wafer source
Lead frame	Copper Alloy	Copper Alloy	Same material
Die Attach Solder	Pb92.5/Sn5/Ag2.5	Pb92.5/Sn5/Ag2.5	Same Composition
Wirebond	Source (Al Ribbon), Gate (Au wire)	Source (Al Ribbon), Gate (Au wire)	Same material
Plating	Matte Tin	Matte Tin	Same Composition
Molding Compound	CEL9240HF10-L8	G700LA	Both Green/ Halogen Free
Packing	13inch Plastic Reel	13inch Plastic Reel	Same size/material

Full electrical characterization and high reliability testing has been completed on representative part number. There is no change to device functionality or electrical specifications in the datasheet.

**Qualification and Reliability Result:****A.1 Electrical Test Result**

Item	Spec LSL	Spec USL	Units	Test Results					Results
				Max.	Avg.	Min.	sigma	Cpk	
Vth	1.8	3.8	V	2.989	2.703	2.460	0.097	3.10	PASS
BVDSS	60	--	V	72.73	71.78	66.69	0.550	7.14	PASS
RDSON	--	5	mΩ	4.83	4.23	2.88	0.098	2.63	PASS
IDSS	--	1	uA	0.05	0.022	0.0002	0.011	28.70	PASS

## B. Qualification Grade: Automotive (AEC-Q101)

Stress Test	Abbrev	Test Methods	Test Conditions	Final Readpoint	Requirements		Results	
					SS	# Lots	Rej/SS	Remarks
Environmental and Lifetime Stress Tests								
Pre- and Post-Stress Electrical Test	TEST	Product Datasheet	Test at room temp	-	All	3	0 Fails	Passed
External Visual	EV	JESD22-B101	per reference standard	-	All	3	0 Fails	Passed
Preconditioning	PC	J-STD-020	MSL-1 (3x reflow at 260°C)	-	308	3	0/308	Passed
Temperature Cycle	TC	JESD22-A104	-55°C to +150°C; 15 mins dwell	1000 cycs	77	3	0/231	Passed
Unbiased HAST	UHA	JESD22-A118	130°C/85% RH; unbiased	96 hrs	77	3	0/231	Passed
Highly Accelerated Stress Test	HAST	JESD22-A110	110°C/85% RH; Vr = 32V	264 hrs	77	3	0/231	Passed
Resistance to Solder Heat	RSH	JESD22-A111	SMD (Pb free): 260°C; 10 sec	10 secs	30	3	0/90	Passed
High Temp Reverse Bias	HTRB	MIL-STD-750-1	175°C; Vr = 40V	1000 hrs	77	3	0/231	Passed
High Temp Gate Bias	HTGB	JESD22-A108	175°C; Vgs = 20V	1000 hrs	77	3	0/231	Passed
Intermittent Operating Life	IOL	MIL-STD-750	Link	15000 cycs	77	3	0/231	Passed
Package Assembly Integrity Tests								
Destructive Physical Analysis	DPA	AEC-Q101-004	Post-TC	results	2	3	0/6	Passed
Destructive Physical Analysis	DPA	AEC-Q101-004	Post-HAST	results	2	3	0/6	Passed
Temp Cycle Delamination Test	TCDT	JESD22-A104	Post-TC	results	77	3	0/231	Passed
Wire Bond Pull	WBP	MIL-STD-750-2	per assembly spec	results	30	3	0/90	Passed
Wire Bond Shear	WBS	AEC Q101-003	per assembly spec	results	30	3	0/90	Passed
Solderability	SD	J-STD-002	260°C	results	10	3	0/30	Passed
Thermal Resistance	TR	JESD24	per product datasheet	results	10	1	0/10	Passed
Physical Dimension	PD	JESD22-B100	per assembly spec	results	30	3	0/90	Passed
Die Shear	DS	MIL-STD-750-2	per assembly spec	results	30	3	0/90	Passed
Electrical Verification Tests								
Parametric Verification	PV	TSC Datasheet	per product datasheet	results	25	3	0/75	Passed
ESD - Human Body Model	ESD - HBM	AEC-Q101-001	per product spec	results	30	3	0/90	Class H1C
ESD - Charged Device Model	ESD - HBM	AEC-Q101-005	per product spec	results	30	3	0/90	Class C5

### Conclusion:

Successfully passed Automotive-grade qualification per AEC-Q101 Rev. E.

### Effect of Change:

There is no impact in product Form, Fit and Function. No change in datasheet parameters and product performance.

**List of Affected Devices:**

Family	Package	Ordering Code
Single N-Channel Power MOSFET	PDFN56U	TQM050NB06CR RLG
Single N-Channel Power MOSFET	PDFN56U	TQM130NB06CR RLG
Single N-Channel Power MOSFET	PDFN56U	TQM250NB06CR RLG
Single N-Channel Power MOSFET	PDFN56U	TQM300NB06CR RLG
Single N-Channel Power MOSFET	PDFN56U	TQM033NB04CR RLG
Single N-Channel Power MOSFET	PDFN56U	TQM033NB04CR-V RLG
Single N-Channel Power MOSFET	PDFN56U	TQM070NB04CR RLG
Single N-Channel Power MOSFET	PDFN56U	TQM110NB04CR RLG
Single N-Channel Power MOSFET	PDFN56U	TQM150NB04CR RLG
Single N-Channel Power MOSFET	PDFN56U	TQM025NB04CR RLG