Product Change Notification / JAON-21SZYY684

Date:

27-Oct-2021

Product Category:

Power Discrete Components

PCN Type:

Manufacturing Change

Notification Subject:

eSign # E000072861 Final Notice: Qualification of MSCO (Microchip - Fab 5) as an additional wafer fabrication site for selected Microsemi Silicon DQ 600V Diode PSDS (Power Switching Discrete Solutions) products.

Affected CPNs:

JAON-21SZYY684_Affected_CPN_10272021.pdf
JAON-21SZYY684_Affected_CPN_10272021.csv

Notification Text:

PCN Status: Final Notification

PCN Type: Manufacturing Change

Microchip Parts Affected: Please open one of the files found in the Affected CPNs section.
Note: For your convenience Microchip includes identical files in two formats (.pdf and .xls)

Description of Change: Qualification of MSCO (Microchip - Fab 5) as an additional wafer fabrication site for selected Microsemi Silicon DQ 600V Diode PSDS (Power Switching Discrete Solutions) products.

Pre and Post Change Summary:

	Pre Change	Post Change

Silicon DQ Diode Wafer Fabrication Site	Episil Technologies Inc (EHTW)	Episil Technologies Inc (EHTW)	Microchip Technology Colorado – Fab 5 (MCSO)
Certifications	ISO-9001 IATF16949	ISO-9001 IATF16949	ISO-9001 IATF16949 ISO-14001

Impacts to Data Sheet: None

Change Impact None

Reason for Change: To improve manufacturability and on-time delivery performance by qualifying MSCO as an additional fabrication site.

Change Implementation Status: In Progress

Estimated First Ship Date: November 1, 2021 (date code: 2145)

Note: Please be advised that after the estimated first ship date customers may receive pre and post change parts.

Time Table Summary:

	October 2021					**November 2021**				
Workweek	40	41	42	43	44	45	46	47	48	49
Qual Report Availability					X					
Final PCN Issue Date					X					
Estimated Implementation Date						X				

Method to Identify Change: Traceability code

Qualification Report: Please open the attachments included with this PCN labeled as PCN_#_Qual_Report.

Revision History: October 27, 2021: Issued final notification.

The change described in this PCN does not alter Microchip's current regulatory compliance regarding the material content of the applicable products.

Attachments:

PCN_JAON-21SZYY684_Qual_Report.pdf

Please contact your local Microchip sales office with questions or concerns regarding this notification.

Terms and Conditions:

If you wish to receive Microchip PCNs via email please register for our PCN email service at our PCN home page select register then fill in the required fields. You will find instructions about registering for Microchips PCN email service in the PCN FAQ section.

If you wish to change your PCN profile, including opt out, please go to the PCN home page select login and sign into your myMicrochip account. Select a profile option from the left navigation bar and make the applicable selections.

Affected Catalog Part Numbers (CPN)

APT100GN60LDQ4G
APT100GT60JRDQ4
APT150GN60JDQ4
APT150GN60LDQ4G
APT15DQ60BCTG
APT15DQ60BG
APT15DQ60KG
APT15DQ60SG
APT15GP60BDQ1G
APT15GT60BRDQ1G
APT200GN60JDQ4
APT20GN60BDQ1G
APT20GN60BDQ2G
APT20GN60SDQ2G
APT20GT60BRDQ1G
APT2X100DQ60J
APT2X101DQ60J
APT2X30DQ60J
APT2X31DQ60J
APT2X60DQ60J
APT2X61DQ60J
APT30DQ60BCTG
APT30DQ60BG
APT30DQ60BHBG
APT30DQ60KG
APT30GN60BDQ2G
APT30GP60BDQ1G
APT30GS60BRDQ2G
APT30GT60BRDG
APT30GT60BRDQ2G
APT36GA60BD15
APT36GA60SD15
APT40DQ60BCTG
APT40DQ60BG
APT40GP60B2DQ2G
APT40GP60JDQ2
APT44GA60BD30
APT47GA60JD40
APT50GN60BDQ2G
APT50GN60BDQ3G
APT50GP60B2DQ2G
APT50GP60JDQ2
APT50GS60BRDQ2G
APT50GT60BRDQ1G
APT50GT60BRDQ2G
APT54GA60BD30

APT60DQ60BCTG
APT60DQ60BG
APT60DQ60SG
APT60GA60JD60
APT60GT60JRDQ3
APT65GP60JDQ2
APT65GP60L2DQ2G
APT68GA60B2D40
APT68GA60LD40
APT75DQ60BG
APT75DQ60D
APT75DQ60SG
APT75GN60LDQ3G
APT75GN60SDQ2G
APT80GA60LD40
APT80GP60JDQ3

QUALIFICATION REPORT SUMMARY

RELIABILITY LABORATORY

PCN#: JAON-21SZYY684

Date
October 22, 2021

Qualification of MSCO (Microchip - Fab 5) as an additional wafer fabrication site for selected Microsemi Silicon DQ 600V Diode PSDS (Power Switching Discrete Solutions) products.

Purpose: Qualification of MSCO (Microchip - Fab 5) as an additional wafer fabrication site for selected Microsemi Silicon DQ 600V Diode PSDS (Power Switching Discrete Solutions) products.

Qualification Summary:

This qualification is to assess the Automotive grade quality and reliability for the DQ FRED technology fabricated at Microchip Fab 5 location in Colorado Springs, Colorado when subjected to testing outlined in the sampling plan below. This effort is to validate a second source for this technology currently at Episil Technologies in Taiwan.

The wafer lots used in this qualification are a large die sized variety for this voltage class and therefore is a high $IF_{(AV.)}$ current rated sample to define this product family. It represents a "worst case" scenario for the over-all DQ FRED 600V family of products. Being such, all dies in this family and other package types in addition to the package vehicle used, are included within this product family and qualification result. (TO-247, TO-220 and TO-264.).

The wafer and assembly processes for the part numbers effected share the same methods, materials and tooling. Deviations from them are governed by Microchip-PSDS Change Control requirements.

Sample Plan.

Manufactures Part #(s):	2x APT30DQ60BG, 2x APT75DQ60BG
Die-Volt(s):	2x 16K4F-060 (1A003), 2x 16F5F-060 (1A005)
Qualification Package(s):	TO-247.
Wafer Fab Lot#(s):	0W0409.1, 0X2194.1, TBD, TBD
Package Date Code(s):	2041, 2123, TBD, TBD.

AEC-Q101 Item	Test	Abrv.	Reference	Location	Test Spec.	No. Lots	Sample Size/Lot	Comments
3	External Visual	EV	JESD22 B-101	Ennis	User Specification	4	610	All units submitted for qualification
4	Parametric Verification	PV		Bend	User Specification	4	25	Per Part Number
5	High Temperature Reverse Bias	HTRB	Mil-Std 750 M1038 Cond A	Ennis	1000 Hours @ Ta=175°C, Rated VRRM	4	77+5	Electrical Tests: Pre, 168 hrs, 500 hrs and 1000 hrs.
7	Temperature Cycle	TC	JESD22 A-104	Ennis	400 Cycles, -55°C to 175°C	4	77+5	Electrical Tests: Pre, 250 and 400 Cycles.
12	Destructive Physical Analysis	DPA	AEC-Q101-004					Thermal testing at Pre and 400 Cycles
8	Unbiased Highly Accelerated Stress Test	UHAST	JESD22 A-110	Ennis	96 Hours, Ta=130°C, RH=85%	4	77+5	Electrical Tests: Pre and 96 hrs.
9	Highly Accelerated Stress Test	HAST	JESD22 A-110	Ennis	96 Hours, 42V, Ta=130°C, RH=85%	4	77+5	Electrical Tests: Pre and 96 hrs.
12	Destructive Physical Analysis	DPA	AEC-Q101-004					
10(alt.).	Intermittent Operating Life	IOL	Mil-Std 750 M1037	Ennis	Cycles=60000/ (x+y), Delta Tj=100°C	4	77+5	Electrical Tests: Pre, 6k and 10k Cycles Thermal testing at Pre and 10k Cycles
11	ESD Characterization	CDM	AEC-Q101-001	Chandler	Destruct.	1	30	Use Generic Data
		HBM	AEC-Q101-005	Chandler	Destruct.	1	30	Use Generic Data
15	Resistance to Solder Heat	RSH	JESD22 B-106	Fastech	Per Part Specification	2	30	Use Generic Data
22	Thermal Resistance	TR	JESD24-3	Bend	Per Part Specification	3	10	Performed in Items 7 and 10(alt.)
23	Wire Bond Strength	WBS	Mil-Std 750 M2037	Fastech		2	5	Min. 10 bonds from each lot.
24	Bond Shear	BS	AEC-Q101-003	Fastech		2	5	Min. 10 bonds from each lot.
25	Die Shear	DS	Mil-Std 750 M2017	Fastech		2	5	5 die from each lot

1. The wafer fab lots selected for quaification represents the three lot requirement of the Soft Recovery Diode family as defined in section A1.1.4 In the AEC-Q101 Rev E document.
2. IOL cycles is to be determined by part specific Pon and Poff rise and fall times (x+y), where # cycles = 60000/(x+y).

Table 2: Reliability tests defined to qualify Fab 5 600V DQ FRED technology.

Qualification Pass Fail Criteria:

Conditional qualification achievement and commercial production risk release of all related 600V DQ FRED dies assembled into TO packaging will be assessed at the completion 500 hours of HTRB, 100 Temperature cycles, 96 hours of UHAST and HAST testing for the two 16K4F-060 dies listed in the plan. Full Automotive qualification, it will require successful completion for the full duration of all four lots and tests in Table 2.

Qualification devices, when subjected to the environmental and reliability tests outlined in the sampling plan in table 2, are to remain within data sheet minimum and maximum specifications for their “Key” parameters as well as to within ±20% of the initial reading. Greater allowances are granted for leakage tests and in the cases of moisture exposure.

If any failures, deviations or observations exceeding these criteria outlined, failure analysis is to be performed to determine the root cause with an Implementation and verification of the corrective action is necessary to justify qualification.

Part Data Sheet Parameter	Measurement Condition (25°C unless specified otherwise.)	Fail Criteria
Forward Voltage (VF), V	IF(Rated)=30A	Greater than 2.4V Greater than ±20% Δ
Reverse Leakage (IR), uA	VR(rated)=600V	Greater than 25uA Greater than 500% Increase (1000% for moisture tests.).
Thermal Resistance (RthJC), °C/W	10 Seconds	Greater than 0.80°C/W Greater than +20% Δ

Table 3: Tested device parameters and conditions.

Qualification Testing Result:

Figure 1 shows the aggregate “key” parameter results before and after the reliability tests outlined in the qualification plan for the lots from Fab 5 to meet the conditional qualification requirements.

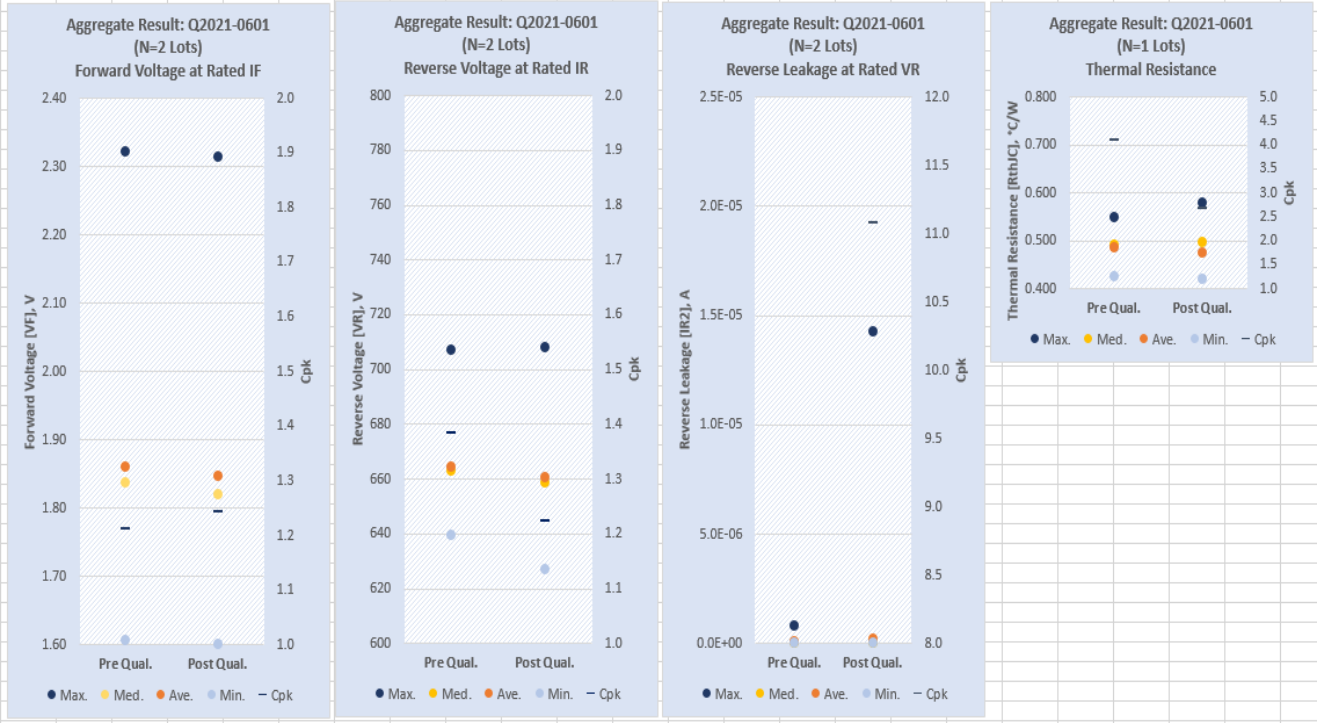

Figure 1: Device “Key Parameters” Pre and Post Reliability Testing.

Table 5 shows the results for the qualification tests outlined in the sample plan above. As of the date of this report, all tests have been completed and no valid failures are to be reported.

Qualification Test	Test Duration	Devices Tested	Device Failures
EV	-	All Devices	0
PV	-	704	0
HTRB	500 Hours	164	0
HAST	96 Hours	164	0
UHAST	96 Hours	164	0
TC RthJC	100 Cycles	106	0

Table 5: Qualification Result.

Conclusion:

This report summarizes the result for the Fab 5 600V DQ FRED family of devices when evaluated to the tests outlined in the sampling plan in table 2. Based on the over-all results presented, no valid design or fabrication failures related to the device occurred during the testing outlined. As of the date of this report, the 600V Fab 5 DQ FRED series of devices are conditionally qualified for production use.