

APS XFAB SiC JBS GEN4 Diode Technology Qualification Report

APS-QR-09-20

REVISION HISTORY

Revision	Description	Author	Date
1	Initial release	Wallace Cheng	29-Dec-2020

References

- [1] Bonding diagram of ACD28QS120A
- [2] Bonding diagram of ACD20AS120E
- [3] Bonding diagram of ACD20QS120A
- [4] Datasheet of ACD28QS120A
- [5] Datasheet of ACD20AS120E
- [6] Datasheet of ACD20QS120A

Summary

Scope of Qualification

<input checked="" type="checkbox"/> New Technology	<input type="checkbox"/> New Package	<input type="checkbox"/> Derivative	<input type="checkbox"/> Design change
<input checked="" type="checkbox"/> NPI	<input type="checkbox"/> Process Change	<input type="checkbox"/> New Subcon	
<input type="checkbox"/> Others, please specify:			

Qualification Summary

Qual Vehicles	ACD28QS120A, ACD20AS120E, ACD20QS120A
Part Number(s) covered	ACD28QS120A, ACD20AS120E, ACD20QS120A
Max Junction Temperature	+175°C
RDSON & Voltage	28A & 20A @ 1200V
Target Package Type	TO-247 and D2PAK
Target Assembly Site	GEM (TO-247) and Hyme (D2PAK)

Qualification Conclusions

This qualification report documents the qualification and reliability test results for Alpha Power Solutions Silicon Carbide (SiC) Junction Barrier Schottky (JBS) Generation 4 (GEN4) Diode Process Technology in XFAB foundry.

Upon completion of all pre-defined requirements on the three JBS GEN4 diode qualification vehicles (ACD28QS120A, ACD20AS120E, & ACD20QS120A), this report certified that XFAB SiC JBS GEN4 Diode Process Technology is qualified per JEDEC STANDARD JESD47 and with conditional reference to Automotive Electronics Council AEC-Q101 standard. Other GEN4 diode derivatives under the same process will have their own qualification.

In summary a full qualification has been conducted which covered a variety of operating life and environmental stresses to assess the quality and reliability performance of device over its useful life span. Total over 1100 units from ACD28QS120A, ACD20QS120A, and ACD20AS120E were stressed and electrically verified with no legitimate failure.

Qualification Lot Information

Qual Lot ID	Device	Wafer Lot Number
Q1	ACD28QS120A	U17236-03
Q2	ACD20AS120E	U17236-05
Q3	ACD20QS120A	U17461-05

Qualification Test Results

Product Level Qualification Test Results

Test Items		# of Lots	SS per lot	Total units	Results (Fail/SS)	Qual point	Summary
High Temperature Reverse Bias (HTRB) JESD22-A108 @Tj=175°C, 100% rated voltage		Q1 Q2 Q3	77	231	0/231	1000hrs	PASSED
Intermittent Operating Life (IOL) MIL-STD-750 Method 1037 @ΔTj=125°C		Q1 Q2 Q3	77	231	0/231	7.5Kcyc	PASSED
Parameter Verification (PV)		Q1 Q2 Q3	25	75	0/75	---	PASSED
Temperature Cycling Test (TCT) JESD22-A104 @+125°C/-40°C		Q1 Q2 Q3	77	231	0/231	1000cyc	PASSED
Highly Accelerated Stress Test (HAST) JESD22-A110 @42V, Ta=130°C 33.5psia, 85%RH		Q1 Q2 Q3	77	231	0/231	96hrs	PASSED
Autoclave (AC) JESD22-A102 @ Ta=121°C, 15psig 100% RH		Q1 Q2 Q3	77	231	0/231	96hrs	PASSED
ESD	Human Body Model (HBM) JS-001 / AEC-Q101-001	Q1 Q2 Q3	3	10	0/30	8KV	PASSED
	Charged Device Model (CDM) JS-002 / AEC-Q101-005	Q1 Q2 Q3	3	10	0/30	1KV	PASSED

- End of Report -