



**Product Reliability Report**

***Scale-iDriver Family AEC-Q100 Automotive  
Qualification Report***

**SIC1132KQ, SIC1152KQ, SIC1181KQ, SIC1182KQ**

**eSOP-R16B Package**

**Version 1.0 – October 25, 2019**

Summary: The Scale-iDriver IC family consisting of the SIC1132KQ, SIC1152KQ and SIC1182KQ has been qualified for automotive applications per the requirements of AEC-Q100 Rev H. These products consist of a common primary-side die and nearly identical secondary-side die that differ only in their GH pin drive currents and GL pin sink currents, and thus differ in the size of their GH and GL pin power-MOSFETs. The SIC1182KQ has the highest current capabilities in the family and thus the largest secondary-side die, so this device was selected for qualification and the SIC1132KQ and SIC1152KQ are qualified by extension as specified per AEC-100 Rev H.

### Qualification Results

Item	Stress Test per AEC-Q100 Rev. H	Abbr.	Test Condition	Reference	Lab	#Lots	Sample Size	#Failed	Results	Comments
A1	Pre-conditioning	PC	MSL3 (24 Hour 150°C Bake + 40 Hour 60°C/60% R.H. Soak + 3X 260°C Reflow) Applied to THB/uHAST/TC/PT C samples	JESD22 A-113; J-STD-020	PISJ	3	Per Tests	0 / 738	Passed	MSL3
A2	Temperature-Humidity-Bias	THB	85°C / 85% R.H. for 1,000 Hours; 5 mins On and 5 mins Off	JESD22 A-101	PISJ	3	77	0 / 230 <sup>1</sup>	Passed	note 1: one lot had one unit got damaged during read point testing due to mishandling
A3	Unbiased HAST	UHST	110°C / 85% R.H. for 264 Hours;	JESD22 A-118	EAG	3	77	0 / 231	Passed	
A4	Temperature Cycling	TC	-40°C / +125°C for 1,544 Cycles (Grade 1)	JESD22 A-104	PISJ	3	77	0 / 231	Passed	
A5	Power Temperature Cycling	PTC	-40°C / +125°C for 1,000 Cycles (Grade 1) 5 mins On and 5 mins Off	JESD22 A-105	PISJ	1	45	0 / 45	Passed	
A6	High Temperature Storage Life	HTSL	150°C for 1,000 Cycles (Grade 1)	JESD22 A-103	PISJ	1	45	0 / 45	Passed	
B1	High Temperature Operating Life	HTOL	125°C Tj for 1,000 Hours (Grade 1)	JESD22 A-108	PISJ	3	77	0 / 231	Passed	
B2	Early Life Failure Rate	ELFR	125°C Tj for 48 Hours	AEC Q100-008	PISJ	3	800	0 / 2400	Passed	
B3	NVM Endurance, Data Retention	EDR		AEC Q100-005					N/A	Not applicable; apply to NVM or IC with OTP memory only
C1	Wire Bond Strength	WBS	30 bonds from a minimum of 5 units	AEC Q100-001; AEC Q003	UNISEM	3	30	0 / 90	Passed	For the 3 qual lots: 1 mil wire: Cpk = 2.36, 2.20, 2.34; 2 mil wire: Cpk = 2.13, 2.18, 2.09.

C2	Wire Bond Pull	WBP	30 bonds from a minimum of 5 units	Mil-Std-883 Method 2011; AEC Q003	UNISEM	3	30	0 / 90	Passed	For the 3 qual lots: 1 mil wire: Cpk = 3.49, 2.73, 2.78; 2 mil wire: Cpk = 3.56, 3.53, 3.77.
C3	Solderability	SD		JESD22 B-102	UNISEM	3	15	0 / 45	Passed	
C4	Physical Dimensions	PD		JESD22 B-100/108; AEC Q003	UNISEM	3	12	0 / 36	Passed	
C5	Solder Ball Shear	SBS		AEC Q100-010; AEC Q003					N/A	Not applicable; applicable to BGA only
C6	Lead Integrity	LI		JESD22-B105					N/A	Not applicable to SMD; for T/H only
D1	Electromigration	EM		JESD61		-	-	-	Passed	Data available as part of technology development
D2	Time Dependent Dielectric Breakdown	TDDB		JESD35		-	-	-	Passed	Data available as part of technology development
D3	Hot Carrier Injection	HCI		JESD60 and JESD28		-	-	-	Passed	Data available as part of technology development
D4	Negative Bias Temperature Stability	NBTI		JESD90		-	-	-	Passed	Data available as part of technology development
D5	Stress Migration	SM		JESD61, JESD87 and JESD202		-	-	-	Passed	Data available as part of technology development
E1	Pre- and Post-Stress Function/Parameter	TEST	Test all data sheet parameters at 25°C, -40°C, 125°C (Note -40°C requires for HTOL only)	Data Sheet Spec	PISJ	3	77	0 / 231	Passed	
E2	ESD Human Body Model	HBM	500V, 1KV, 1.5KV, 2KV; 3 units per voltage level	JEDEC JS-001 AEC Q100-002	PISJ	1	3 x 4 Levels	see comment	Class 2	Passed 500V, 1KV, 1.5KV, 2KV on all pins
E3	ESD Charged Device Model	CDM	250V, 500V, 750V & 1KV; 3 units per voltage level	AEC Q100-011	PISJ	1	3 x 4 Levels	see comment	Class C3	Passed 250V, 500V, 750V & 1KV on all pins

E4	Latch-Up	LU	>+/- 100mA, 150% of V_max @ 125°C	AEC Q100-004	PISJ	1	6	0 / 6	Passed	
E5	Electrical Distributions	ED	Same as E5	AEC Q100-009; AEC Q003	PISJ	3	35	0 / 105	Passed	All datasheet parameters have CPK of at least 1.67
E6	Fault Grading	FG		AEC Q100-007					N/A	Not applicable to an asynchronous mixed signal device
E7	Characterization	CHAR	Same as E5	AEC Q003	PISJ	-	-	-	Passed	Covered by E5
E9	Electromagnetic Compatibility	EMC	VCC=5V; VISO=25V; IN=10Vpp, 20KHz, 50% Duty cycle	SAE J1752/3-Radius Emissions	AMETEK CTS	1	1	-	N/A	Completed.
E10	Short Circuit Characterization	SC		AEC Q100-012					N/A	Not applicable; SIC1182KQ is not a smart power device, and does not belong to a 12V system
E11	Soft Error Rate	SER							N/A	Not applicable; SIC1182KQ does not contain any non-volatile memory
E12	Lead (Pb) Free	LF		AEC Q005	UNISEM	-	-	-	Passed	Completed and passed.