



AEC-Q200 vs. Vishay Qualification Plan Inductor Division, Standard Products

AEC-Q200 VS. VISHAY QUALIFICATION PLAN					
STRESS	NO.	QUALIFICATION PLAN PER AEC-Q200 REV. D		VISHAY INTERNAL QUALIFICATION PLAN	
		REFERENCE SPECIFICATION METHOD / CONDITION	TEST CONDITION PER AEC-Q200	REFERENCE SPECIFICATION METHOD / CONDITION	TEST CONDITION PER VISHAY TEST PLAN
Preconditioning	0	-	-	-	3x reflow for lead (Pb)-free products using a lead free reflow profile
Pre- and post-stress electrical test	1	User specifications	Test is performed except as specified in the applicable stress reference and the additional requirements in table 5	IHLP datasheet	L (μH) - 100 kHz and 250 mV; DCR - 25 °C ambient
High temperature exposure (storage)	3	MIL-STD-202 method 108	1000 h at rated operating temperature (e.g. 125 °C part can be stored for 1000 h at 125 °C; same applies for 105 °C and 85 °C; unpowered; measurement at 24 h ± 4 h after test conclusion	MIL-STD-202 method 108	Unpowered; readings at 0 h, 250 h, 500 h, 1000 h, and 2000 h intervals; initial (0 h) and final (2000 h) readings at LT / RT / HT; LT = low temperature = -55 °C; RT = room temperature = +25 °C; HT= high temperature = +125 °C for A1 / 1A, +155 °C for -5 A, +180 °C for -8 A
Low temperature storage	-	Not required by AEC-Q200	n/a	IEC-60068 part 2-1 test group Aa	-55 °C for 2000 h (+24 h, -0 h); unpowered; readings at 0 h, 250 h, 500 h, 1000 h, and 2000 h intervals; initial (0 h) and final (2000 h) readings at LT / RT / HT
Temperature cycling	4	JESD22 method JA-104	1000 cycles (-40 °C to +125 °C) Note: if 85 °C part or 105 °C part the 1000 cycles will be at that temperature; measurement at 24 h ± 4 h after test conclusion; 30 min maximum dwell time at each temperature extreme; 1 min; maximum transition time	JESD22 method JA-104	-55 °C to +125 °C for A1 / 1A; -55 °C to +155 °C for 5A; -55 °C to +180 °C for 8A; 2000 cycles; dwell = 30 min; transfer time ≤ 10 s; readings at 0 h, 250 h, 500 h, 1000 h, and 2000 h cycle intervals; initial (0 cycle) and final (2000 cycle) readings at LT / RT / HT
Biased humidity	7	MIL-STD-202 method 103	1000 h, 85 °C / 85 % RH; unpowered; measurement at 24 h ± 4 h after test conclusion	MIL-STD-202 method 103	Temperature = 85 °C ± 5 °C; humidity = 85 % ± 5 % RH; duration = 1000 h; power = no power; readings at 0 h, 250 h, 500 h, and 1000 h intervals; initial (0 h) and final (1000 h) readings at LT / RT / HT; final measurement after test conclusion at 24 h ± 4 h
Operational life	8	MIL-PRF-27	1000 h at 105 °C; if 85 °C or 125 °C part will be tested at that temperature; measurement at 24 h ± 4 h after test conclusion	MIL-STD-202 method 108	Temperature = 85 °C for -1A / A1; temperature = 115 °C for -5A; temperature = 140 °C for -8A; duration = 2000 h; power = 100 % rated current continuous; readings at 0 h, 250 h, 500 h, 1000 h, and 2000 h intervals; initial (0 h) and final (2000 h) readings at LT / RT / HT
External visual	9	MIL-STD-883 method 2009	Inspect device construction, marking and workmanship; electrical test not required	MIL-STD-883 method 2009	Inspect construction and workmanship



AEC-Q200 VS. VISHAY QUALIFICATION PLAN					
STRESS	NO.	QUALIFICATION PLAN PER AEC-Q200 REV. D		VISHAY INTERNAL QUALIFICATION PLAN	
		REFERENCE SPECIFICATION METHOD / CONDITION	TEST CONDITION PER AEC-Q200	REFERENCE SPECIFICATION METHOD / CONDITION	TEST CONDITION PER VISHAY TEST PLAN
Physical dimension	10	JESD22 method JB-100	Verify physical dimensions to the applicable device detail specification Note: user(s) and suppliers specifications electrical test not required	JESD22 method JB-100	Verify L, W, H dimensions per part specification; L = length of part over the leads; W = width of part opposite side of leads; H = height of part including the leads
Terminal strength (lead)	11	MIL-STD-202 method 211	Test leaded device lead integrity only; conditions: A (910 g), C (1.13 kg), E (1.45 kg-mm)	Not performed at Vishay	IHLP inductors are surface-mount
Resistance to solvents	12	MIL-STD-202 method 215	Note: add aqueous wash chemical; OKEM clean or equivalent; do not use banned solvents	MIL-STD-202 method 215	Add aqueous wash chemical; OKEM clean or equivalent; do not use banned solvents
Mechanical shock	13	MIL-STD-202 method 213	Figure 1 of Method 213; condition C	MIL-STD-202 method 213	Pulse shape: half sine; normal pulse length: 6 ms; peak acceleration: 100 g; no. shocks: 6 each in both directions of each axis (total of 36); initial and final readings at LT / RT / HT
Vibration	14	MIL-STD-202 method 204	5 g's for 20 min, 12 cycles each of 3 orientations Note: use 8" x 5" PCB, 0.031" thick, 7 secure points on one long side and 2 secure points at corners of opposite sides; parts mounted within 2" from any secure point; test from 10 Hz to 2000 Hz	MIL-STD-202 method 204	Pulse shape: sine wave; range of frequency 1: 10 Hz to 55 Hz; amplitude: ± 0.75 mm; range of frequency 2: 55 Hz to 2000 Hz; amplitude: 10 g; frequency sweep: 0.5 oct/min; duration: 24 h each of 3 axis; initial and final readings at LT / RT / HT
Bump		Not required by AEC-Q200	n/a	IEC-60068 part 2-27 precondition per 0 above	Pulse shape: half sine; normal pulse length: 6 ms; peak acceleration: 40 g; no. shocks: 4000 each mechanical axis; initial and final readings at LT / RT / HT
Resistance to soldering heat	15	MIL-STD-202 method 210	Condition B no pre-heat of samples; Note: single wave solder - procedure 2 for SMD and procedure 1 for leaded with solder within 1.5 mm of device body	MIL-STD-202 method 210 condition K	IR / convection reflow; 250 °C to 260 °C for 30 s ± 5 s; ramp rate 1 °C/s to 4 °C/s; above 183 °C for 90 s to 120 s
ESD	17	AEC-Q200-002 or ISO / DIS 10605	-	AEC-Q200-002	Determine the classification of the part
Solderability	18	J-STD-002	For both leaded and SMD; electrical test not required; magnification 50x; conditions: leaded: method A at 235 °C, category 3; SMD: a) method B, 4 h at 155 °C dry heat at 235 °C b) method B at 215 °C category 3 c) method D category 3 at 260 °C	J-STD-002	See table below



AEC-Q200 VS. VISHAY QUALIFICATION PLAN					
STRESS	NO.	QUALIFICATION PLAN PER AEC-Q200 REV. D		VISHAY INTERNAL QUALIFICATION PLAN	
		REFERENCE SPECIFICATION METHOD / CONDITION	TEST CONDITION PER AEC-Q200	REFERENCE SPECIFICATION METHOD / CONDITION	TEST CONDITION PER VISHAY TEST PLAN
Electrical characterization	19	User specifications	Parametrically test per lot and sample size requirements, summary to show min., max.; mean and standard deviation at room as well as min. and max. operating temperatures	Not performed as a stand-alone test	Since Vishay performs initial and final electrical measurements at LT, RT, HT, the requirements for electrical characterization of AEC-Q200 are met; electrical characterization is not performed as a stand-alone test
Flammability	20	UL 94	V-0 or V-1 acceptable	Not performed	The iron body of the IHLP inductor is inherently non-flammable; after repeated passing results, this test was deleted from Vishay's qualification plan
Board flex	21	AEC-Q200-005	60 s minimum holding time	AEC-Q200-005	2 mm min. flex for 60 s (+5 s); speed: 1 mm/s
Terminal strength (SMD)	22	AEC-Q200-006		AEC-Q200-006	Force of 1.8 kg (17.7 N) for 60 s

Note

- Pre-stress electrical tests also serve as electrical characterization. Interval measurements for 1000 h tests required at 250 h and 500 h. Interval measurements for 2000 h tests required at 250 h, 500 h, and 1000 h. Preconditioning required for tests 3, 4, 7, 8, 13, 14, low temperature storage and bump tests.

VISHAY INDUCTOR SOLDERABILITY TEST PLAN								
TEST	AGING		SOLDER TEMP.	SOLDER TYPE	HOT PLATE PRE-CONDITIONING	DIP TIME	FLUX	FLUX IMMERSION TIME ⁽¹⁾
	METHOD	TIME						
B Lead (Pb)-free soldering backward compatibility	Dry heat	16 h ± 30 min at 155 °C	215 °C ± 5 °C	Sn63Pb37 or SN60Pb40	Temp. = 125 °C; time = 150 s ± 30 s	≤ 5050 = 5 s ± 0.5 s; ≥ 6767 = 20 s ± 0.5 s	182	5 s to 10 s
B1	Dry heat	16 h ± 30 min at 155 °C	245 °C ± 5 °C	SnAg3.5Cu0.5	Temp. = 125 °C; time = 150 s ± 30 s	≤ 5050 = 5 s ± 0.5 s; ≥ 6767 = 20 s ± 0.5 s	Per J-STD-002	5 s to 10 s

Note

- ⁽¹⁾ Prior to flux immersion, parts shall be preheated to +125 °C ± 10 °C preheat time to be 2 min to 3 min max.

VISHAY INDUCTOR SOLDERABILITY TEST PLAN							
TEST	AGING		SOLDER TEMP.	SOLDER TYPE	TEST SUBSTRATE	IR / CONVECTION REFLOW	
	METHOD	TIME				PREHEAT	REFLOW
S1	Dry heat	16 h ± 30 min at 155 °C	230 °C ± 3 °C	SAC 305	Ceramic plate or any substrate that is not wettable	150 °C to 180 °C for 60 s to 120 s	230 °C ± 3 °C for 30 s to 60 s