



Vishay Qualification Testing - Automotive Grade Inductors

By Doug Lillie

Vishay offers Automotive Grade inductors in the IHLP, IHLM, IHLW, IHLE, IHLD, IHCL, and IHTH series. These series are qualified according to the AEC-Q200 qualification plan as a baseline. As noted in the table below, Vishay exceeds many of the critical AEC-Q200 qualification requirements, providing even more confidence that Vishay inductors will withstand the rigors of automotive applications.

TEST	DESCRIPTION	QUALIFICATION PLAN PER AEC-Q200 REV. C		VISHAY QUALIFICATION PLAN PER ICP-10,373	
		REF. SPEC. METH. / COND.	TEST COND. PER AEC-Q200	REF. SPEC. METH. / COND.	TEST COND. PER VISHAY BLUE TEXT INDICATES VISHAY TESTING EXCEEDS AEC-Q200
0 ⁽¹⁾	Preconditioning for lead (Pb)-free products	AEC-Q200 Rev. C - lead (Pb)-free specific tests table 4.2	As specified in sections 4.3.1 thru 4.3.3, except visual per DPS-11,865 10X magnification	ICP-10,373	Same as AEC-Q200
1	Pre-stress and post-stress electrical test	IHLP datasheet	L (µH) - 100 kHz and 250 mV DCR - 25 °C ambient	IHLP datasheet	Same as AEC-Q200
3	High temperature exposure	MIL-STD-202G Method 108A Condition D	125 °C for 1000 h (+24 h, -0 h); unpowered	IEC 60068 Part 2-2 test group BA	+125 °C for 2000 h for A1 / 1A series; +155 °C for 2000 h for 5A series; +180 °C for 2000 h for 8A series; unpowered; readings at 0 h, 250 h, 500 h, 1000 h, and 2000 h intervals
	Low temperature storage		Not specified	IEC 60068 Part 2-1 test group Aa	-55 °C for 2000 h, unpowered; readings at 0 h, 250 h, 500 h, 1000 h, and 2000 h intervals
4	Temperature cycling	JESD22 Method JA-104	-40 °C to +125 °C, 1000 cycles; dwell = 0.25 h	IEC 60068 Part 2.14 test group Na	-55 °C to +125 °C for A1 / 1A series; -55 °C to +155 °C for 5A series; -55 °C to +180 °C for 8A series; 1000 cycles; dwell = 0.5 h
6	Moisture resistance	MIL-STD-202G Method 106G	10 continuous 24 h cycles, steps 7a and 7b not required; unpowered; measurement at 24 h ± 2 h after conclusion	MIL-STD-202 Method 106	Same as AEC-Q200

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7	Biased humidity	MIL-STD-202G Method 103B	1000 h at 85 °C / 85 % RH, unpowered; measurement within 24 h ± 2 h after test	IEC 60068 Part 2-67 test group	Same as AEC-Q200
8	Operational life	MIL-PRF-27 Section 4.7.23	1000 h at 85 °C with full rated current. Do not perform the following tests: - Open or short circuit during test - Induced voltage after test - Insulation resistance after test - DWV after test	MIL-STD-202 Method 108A	Temperature = 85 °C for A1 / 1A series; temperature = 115 °C for 5A series; temperature = 140 °C for 8A series; duration = 2000 h; power = 100 % rated current continuous; readings at 0 h, 250 h, 500 h, 1000 h, and 2000 h intervals
9 (2)	External visual	MIL-STD-883G Method 2009.9	Inspect construction and workmanship	MIL-STD-883G Method 2009.9	Same as AEC-Q200
10 (3)	Physical dimensions	JESD22 Method JB-100	Verify physical dimensions per part specification	JESD22 Method JB-100	Same as AEC-Q200
12	Resistance to solvents	MIL-STD-202G Method 215K	Add aqueous wash chemical. OKEM clean or equivalent. Do not use banned solvents	MIL-STD-202G Method 215K	Same as AEC-Q200
13 (4)	Mechanical shock	MIL-STD-202G Method 213B Condition C Fig. 1	100 g peak, 6 ms, half-sine waveform, 12.3 ft/s velocity in each of three axis: X, Y, and Z	IEC 60068 Part 2.27 test group Ea with precondition 0 above	Same as AEC-Q200
14 (4)	Vibration	MIL-STD-202G Method 204D	5 g for 20 min, 12 cycles each of 3 orientations; test from 10 Hz to 2000 Hz	IEC 60068 Part 2-6 test group Fc with precondition per 0 above	Pulse shape: sine wave; range of frequency: 10 Hz to 2000 Hz, amplitude 10 g; frequency sweep: 1 oct/min; duration: 24 h each of 3 axis
	Bump		Not specified	IEC 60068 Part 2-27 test group Eb with precondition per 0 above	Pulse shape: half sine; nominal pulse length: 6 ms; peak acceleration: 40 g; number of shocks: 4000 each mechanical axis
15	Resistance to solder heat	MIL-STD-202G Method 210F Condition K	IR / convection reflow; 250 °C ± 5 °C for 30 s ± 5 s; ramp rate 1 °C/s to 4 °C/s; above 183 °C for 90 s to 120 s	MIL-STD-202G Method 210F Condition K	IR / convection reflow; 260 °C ± 5 °C for 30 s ± 5 s; ramp rate 1 °C/s to 4 °C/s; above 183 °C for 90 s to 120 s
16	Thermal shock	MIL-STD-202G Method 107G	-40 °C / +125 °C; 300 cycles; 20 s transfer; 15 min dwell		Same as AEC-Q200

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17	ESD	AEC-Q200-002	Determine the classification of the part	AEC-Q200-002	Same as AEC-Q200
18	Solderability	J-STD-002C Method B1	4 h at 155 °C dry heat at 255 °C; 90° dipping angle		Same as AEC-Q200
		J-STD-002C Method D1 at 260 °C Category 3	Resistance to dissolution of metallization test; solder bath dip and look; 255 °C ± 5 °C; 20° to 45° dipping angle		Same as AEC-Q200
		J-STD-002C Method B1 Category 3 (forward compatibility)	Solder bath / dip and look test; 260 °C (+0 °C / -5 °C); 90° dipping angle		Same as AEC-Q200
		J-STD-002C Method B Category 3 (backward compatibility)	Solder bath / dip and look test; 220 °C (+5 °C / -0 °C); 90° dipping angle		Same as AEC-Q200
		J-STD-002 Method S1	Not specified	J-STD-002D	Dry heat = 16 h at 155 °C; solder = SnAgCu (96 % / 3.5 % / 0.5 %); solder temp. = 230 °C
19 (5)	Electrical characterization	User specification	Min., max., mean, and standard deviation at min. (-55 °C), room, and max. (+125 °C) operating temperatures; after mounted, allow ± 5 % shift DCR at room temp; -55 °C / +125 °C DCR max. calculated using temp. conversion for copper: $R_2 = [(T_2 + 234.5) / (234.5 + T_A)] \times 1.05 R_A$ (A = ambient, 2 = new con.)		Same as AEC-Q200, with max. temperature as below: +125 °C for A1 / 1A series +155 °C for 5A series +180 °C for 8A series
20	Flammability	UL-94	V-0		Same as AEC-Q200
21	Board flex	AEC-Q200-005 Appendix 2	2 mm minimum flex for 60 s + 5 s	AEC-Q200-005	Same as AEC-Q200
22	Terminal strength	AEC-Q200-006 Appendix 1	Force of 1.8 kg (17.7 N) for 60 s	AEC-Q200-006	Same as AEC-Q200

Notes

- (1) Precondition for test # 3, 4, 6, 7, 8, 16, 21, and 22
- (2) Test performed at manufacturing site
- (3) Reuse for any other test
- (4) Pieces reused for other note 4
- (5) A total of three lots will consist of one low, high, and mid value lot from each family

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