VISHAY

One of the World's Largest Manufacturers of Discrete Semiconductors and Passive Components

Production Part Approval Process

The following PPAP documentation is assembled according to the AIAG, 4th Edition PPAP Manual and applicable customer requirements

IHLP3232DZERxxxM5A

Generic PPAP

Generic PPAP

8/31/2017

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Vishay / Dale Electronics
1505 East Hway 50 Yankton, SD 57078, USA Phone (605) 665-9301 Fax (605) 668-4247

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Note: Generic PPAPs do not include all sections shown in the Table of Contents.
Sections 4,5,6,7,8,12,&18 are only available upon request of a full Automotive PPAP.

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ONE OF THE WORLD'S LARGEST MANUFACTURERS OF DISCRETE SEMICONDUCTORS AND PASSIVE COMPONENTS

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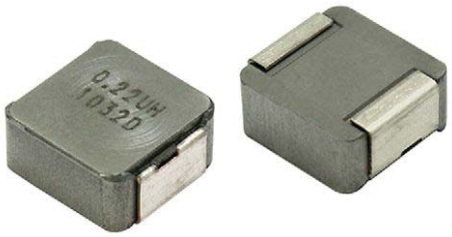
Use the control buttons below to navigate through the PPAP sections.

Section 1. Design Records

Vishay / Dale Electronics
1505 East Hway 50 Yankton, SD 57078, USA Phone (605) 665-9301 Fax (605) 668-4247
ONE OF THE WORLD'S LARGEST MANUFACTURERS OF DISCRETE SEMICONDUCTORS AND PASSIVE COMPONENTS

Low Profile, High Current IHLP® Inductors



FEATURES

- Shielded construction
- Excellent DC/DC energy storage up to 1 MHz to 2 MHz. Filter inductor applications up to SRF (see “Standard Electrical Specifications” table)
- Operating temperature up to 155 °C
- Lowest DCR/µH, in this package size
- Handles high transient current spikes without saturation
- Ultra low buzz noise, due to composite construction
- IHLP design. PATENT(S): www.vishay.com/patents
- AEC-Q200 qualified
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

AUTOMOTIVE GRADE

Pb-free

RoHS COMPLIANT

HALOGEN FREE GREEN (5-2008)

DESIGN SUPPORT TOOLS click logo to get started

3D Models Available

Design Tools Available

STANDARD ELECTRICAL SPECIFICATIONS

L_0 INDUCTANCE ± 20 % AT 100 kHz, 0.25 V, 0 A (µH)	DCR TYP. 25 °C (mΩ)	DCR MAX. 25 °C (mΩ)	HEAT RATING CURRENT DC TYP. (A) (1)	SATURATION CURRENT DC TYP. (A) (2)	SRF TYP. (MHz)
0.22	1.68	1.86	36.0	32.0	117
0.47	2.38	2.55	27.0	19.0	77
0.68	3.30	3.53	21.5	16.2	51
1.0	4.58	4.90	19.0	16.2	45
2.2	11.70	12.50	11.5	14.0	32
3.3	15.40	16.48	11.3	11.8	23
4.7	26.60	28.46	7.2	9.1	18
5.6	29.60	31.67	6.9	9.0	18
10	50.00	53.50	5.1	5.2	13
15	62.00	66.34	4.8	3.6	10
22	103.00	110.21	3.7	3.8	9
33	149.00	159.43	3.1	3.2	6.1

Notes

- All test data is referenced to 25 °C ambient
- Operating temperature range -55 °C to +155 °C
- The part temperature (ambient + temp. rise) should not exceed 155 °C under worst case operating conditions. Circuit design, component placement, PWB trace size and thickness, airflow and other cooling provisions all affect the part temperature. Part temperature should be verified in the end application
- Rated operating voltage (across inductor) = 75 V

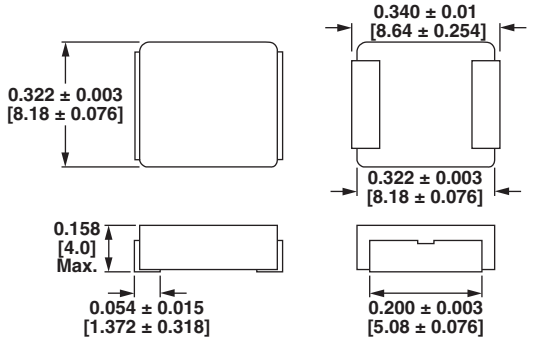
(1) DC current (A) that will cause an approximate ΔT of 40 °C

(2) DC current (A) that will cause L_0 to drop approximately 20 %

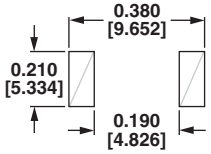
APPLICATIONS

- Engine and transmission control units
- Diesel injection drivers
- DC/DC converters for entertainment/navigation systems
- Noise suppression for motors
  - Windshield wipers
  - Power seats
  - Power mirrors
  - Heating and ventilation blowers
  - HID lighting
- LED drivers

DIMENSIONS in inches [millimeters]



Typical Pad Layout



PATENT(S): www.vishay.com/patents

This Vishay product is protected by one or more United States and International patents.

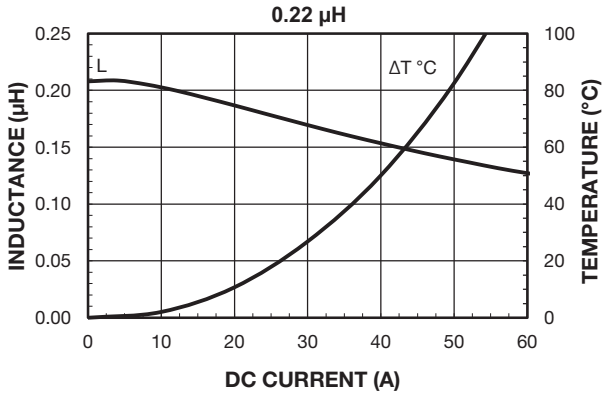
DESCRIPTION

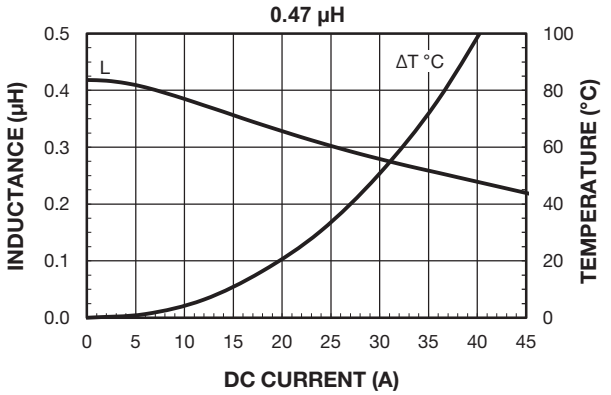
IHLP-3232DZ-5A	10 µH	± 20 %	ER	e3
MODEL	INDUCTANCE VALUE	INDUCTANCE TOLERANCE	PACKAGE CODE	JEDEC® LEAD (Pb)-FREE STANDARD

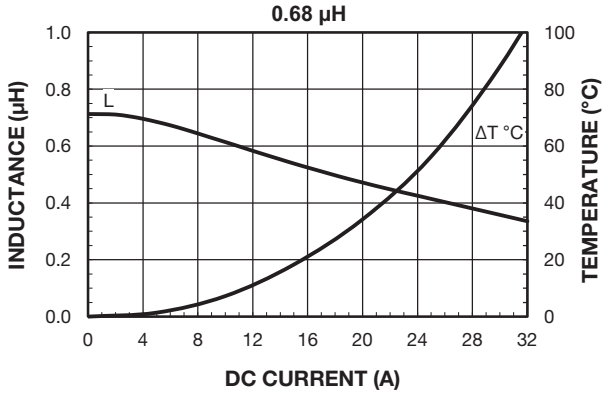
GLOBAL PART NUMBER

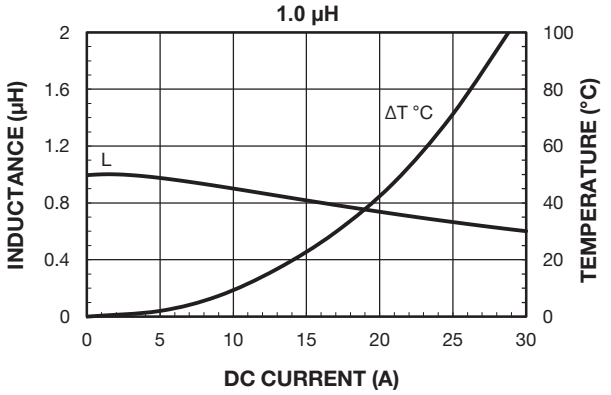
I	H	L	P	3	2	3	2	D	Z	E	R	1	0	0	M	5	A
MODEL				SIZE						PACKAGE CODE		INDUCTANCE VALUE			TOL.	SERIES	

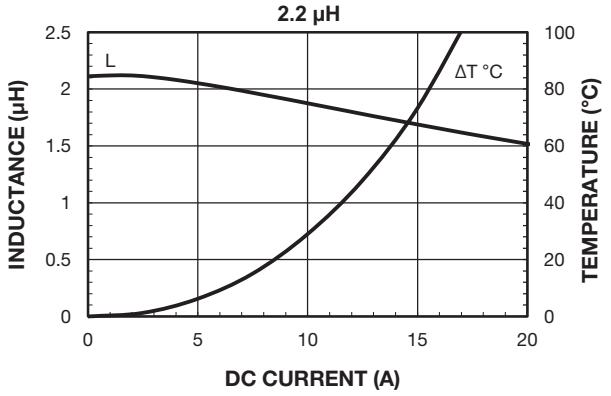
PERFORMANCE GRAPHS

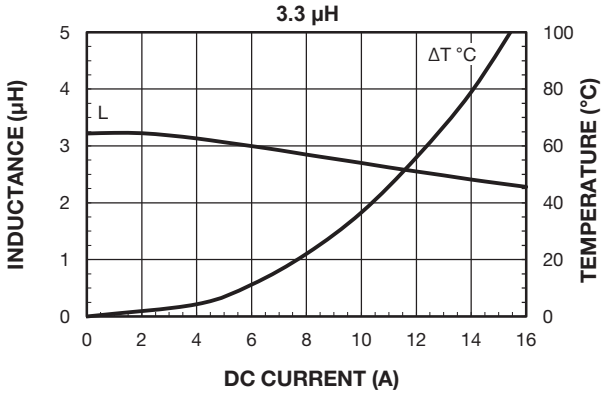




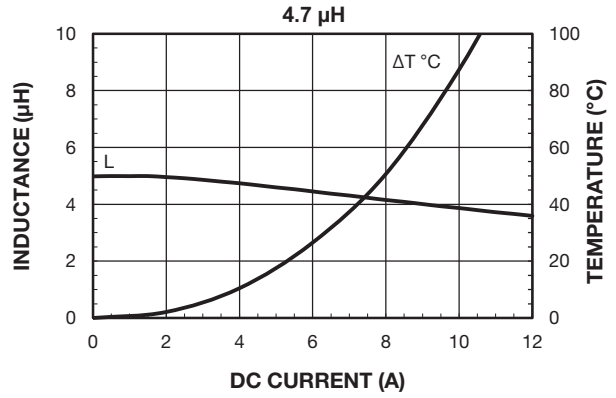


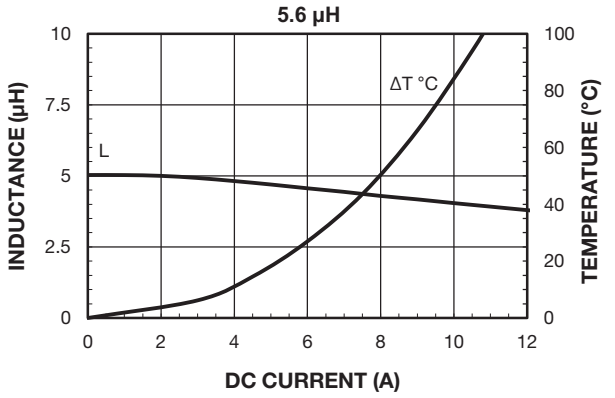


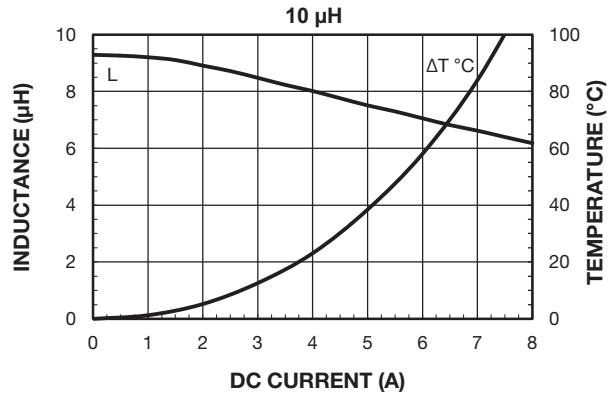


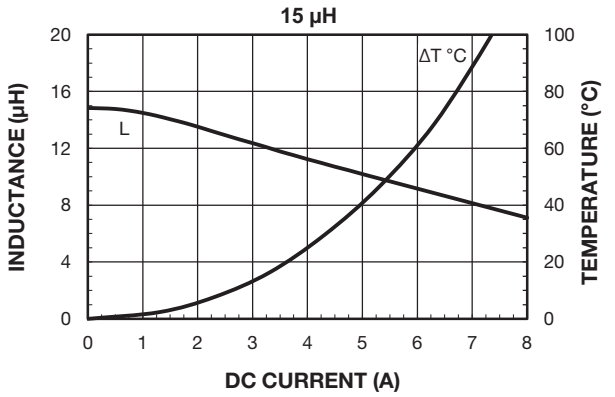


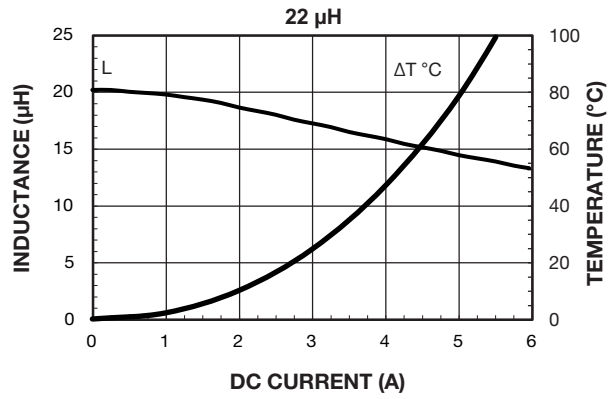
PERFORMANCE GRAPHS

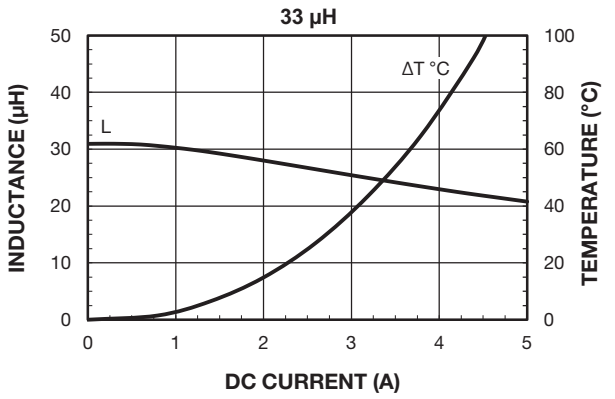




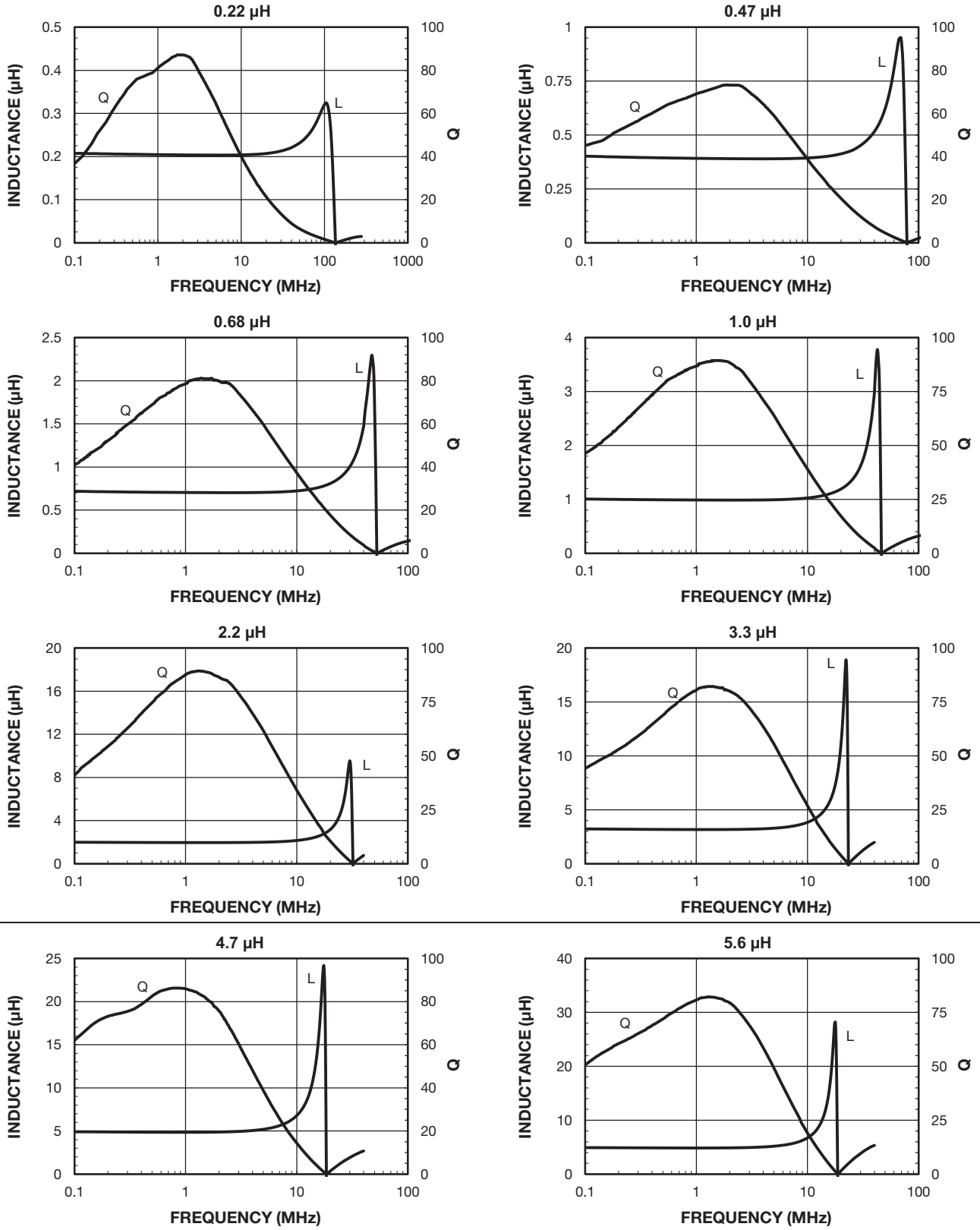




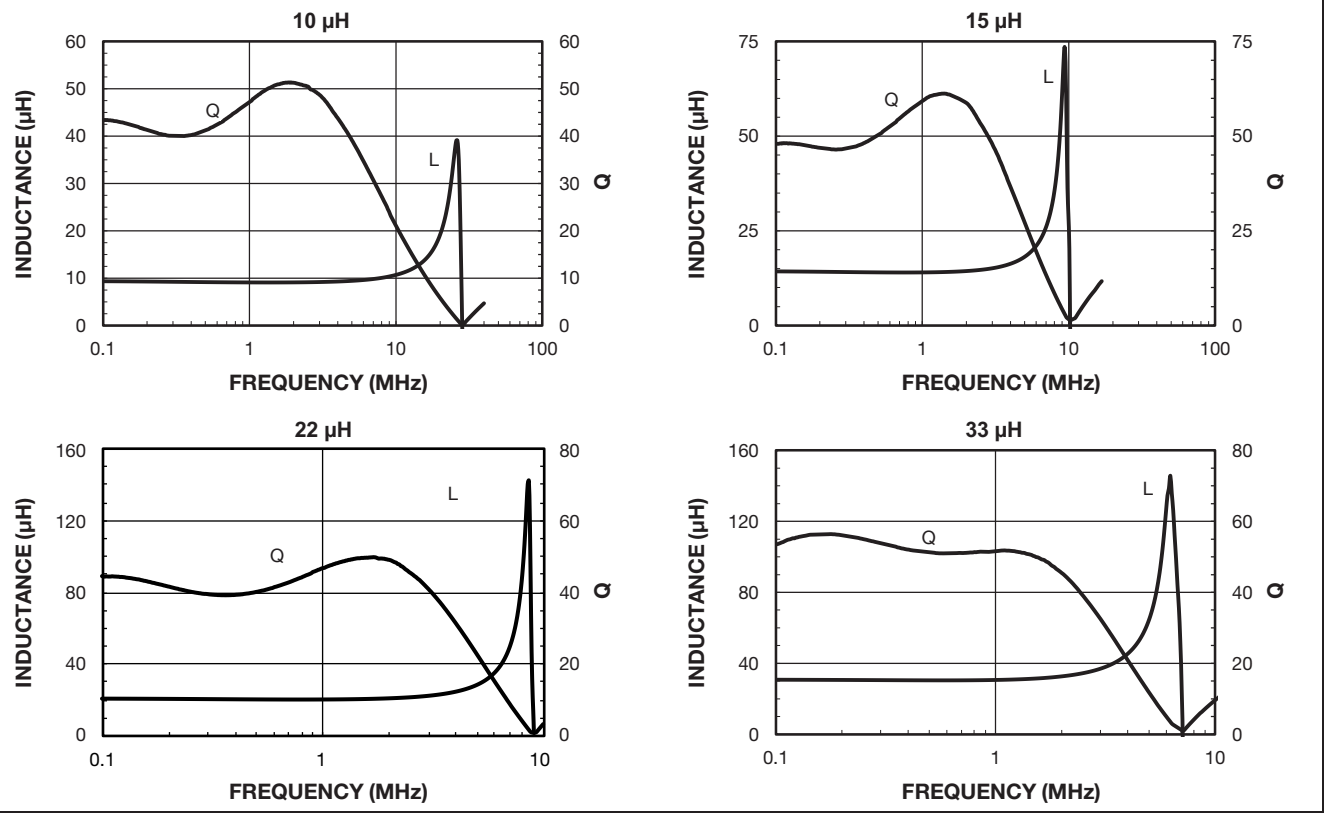




PERFORMANCE GRAPHS: INDUCTANCE AND Q VS. FREQUENCY

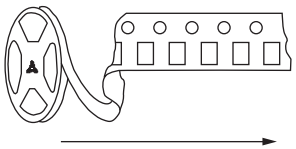


PERFORMANCE GRAPHS: INDUCTANCE AND Q VS. FREQUENCY

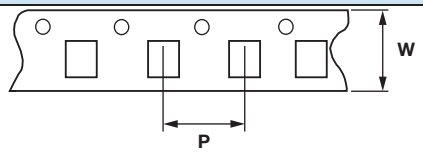


SMD Magnetics Packaging Methods

TAPE AND REEL in inches [millimeters]



User Direction of Feed



Carrier Dimensions

MODEL	PACKAGE CODE			REEL SIZE	CARRIER TAPE WIDTH (W)	COMPONENT PITCH (P)	UNITS/ REEL	PACKAGE CODE			UNITS/ BULK
	PREVIOUS CODE	GLOBAL CODE LEAD (Pb)-BEARING	GLOBAL CODE LEAD (Pb)-FREE					PREVIOUS CODE	GLOBAL CODE LEAD (Pb)-BEARING	GLOBAL CODE LEAD (Pb)-FREE	
IHLP-1212AB	-	-	ER	13	0.472 [12.0]	0.315 [8.0]	3000	-	-	-	-
IHLP-1212AE	-	-	ER	13	0.472 [12.0]	0.315 [8.0]	3000	-	-	-	-
IHLP-1212BZ	-	-	ER	13	0.472 [12.0]	0.315 [8.0]	3000	-	-	-	-
IHLP-1616AB	-	-	ER	13	0.472 [12.0]	0.315 [8.0]	4000	-	-	EB	100
IHLP-1616BZ	-	-	ER	13	0.472 [12.0]	0.315 [8.0]	4000	-	-	EB	100
IHLP-2020AB	-	-	ER	13	0.472 [12.0]	0.315 [8.0]	4000	-	-	EB	100
IHLP-2020BZ	-	-	ER	13	0.472 [12.0]	0.315 [8.0]	2000	-	-	EB	100
IHLP-2020CZ	-	-	ER	13	0.472 [12.0]	0.315 [8.0]	2000	-	-	EB	100
IHLP-2525AH	-	-	ER	13	0.630 [16.0]	0.315 [8.0]	2000	-	-	EB	100
IHLP-2525BD	-	-	ER	13	0.630 [16.0]	0.315 [8.0]	2000	-	-	EB	100
IHLP-2525CZ	-	-	ER	13	0.630 [16.0]	0.315 [8.0]	2000	-	-	EB	100
IHLP-2525EZ	-	-	ER	13	0.630 [16.0]	0.472 [12.0]	500	-	-	EB	100
IHLP-3232CZ	-	-	ER	13	0.630 [16.0]	0.472 [12.0]	1000	-	-	EB	100
IHLP-3232DZ	-	-	ER	13	0.630 [16.0]	0.472 [12.0]	500	-	-	EB	100
IHLP-4040DZ	-	-	ER	13	0.945 [24.0]	0.630 [16.0]	500	-	-	EB	100
IHLP-5050CE	-	-	ER	13	0.945 [24.0]	0.630 [16.0]	500	-	-	EB	100
IHLP-5050EZ	-	-	ER	13	0.945 [24.0]	0.630 [16.0]	250	-	-	EB	100
IHLP-5050FD	-	-	ER	13	0.945 [24.0]	0.630 [16.0]	250	-	-	EB	100
IHLP-6767DZ	-	-	ER	13	0.945 [24.0]	0.945 [24.0]	250	-	-	EB	100
IHLP-6767GZ	-	-	ER	13	0.945 [24.0]	0.945 [24.0]	200	-	-	EB	100
IHLP-8787MZ	-	-	ER	13	1.73 [44.0]	1.26 [32.0]	100	-	-	-	-
IHCL-4040DZ	-	-	ER	13	0.945 [24.0]	0.630 [16.0]	500	-	-	EB	100
IHLM-2525CZ	-	-	ER	13	0.630 [16.0]	0.315 [8.0]	2000	-	-	EB	100
IHLW-4040CF	-	-	ER	13	0.945 [24.0]	0.630 [16.0]	500	-	-	EB	100
IHLW-5050CE	-	-	ER	13	0.945 [24.0]	0.630 [16.0]	500	-	-	EB	100
IFLP-4040DZ	-	-	ER	13	0.945 [24.0]	0.630 [16.0]	500	-	-	EB	100
IFSC-0806AZ	-	-	ER	7	0.315 [8.0]	0.157 [4.0]	2000	-	-	-	-
IFSC-1008AB	-	-	ER	7	0.315 [8.0]	0.157 [4.0]	2000	-	-	-	-
IFSC-1111AZ	-	-	ER	7	0.315 [8.0]	0.157 [4.0]	2000	-	-	-	-
IFSC-1111AB	-	-	ER	7	0.315 [8.0]	0.157 [4.0]	2000	-	-	-	-
IFSC-1515AH	-	-	ER	13	0.472 [12.0]	0.315 [8.0]	2000	-	-	-	-
IHSM-3825	RC2	RE	ER	13	0.945 [24.0]	0.472 [12.0]	750	P09	PJ	EB	100
IHSM-4825	RC2	RE	ER	13	0.945 [24.0]	0.472 [12.0]	750	P09	PJ	EB	100
IHSM-5832	RC3	RF	ER	13	1.26 [32.0]	0.472 [12.0]	500	P09	PJ	EB	100
IHSM-7832	RC4	RG	ER	13	1.73 [44.0]	0.472 [12.0]	500	P09	PJ	EB	100
IDC-2512	-	-	ER	13	0.630 [16.0]	0.315 [8.0]	2000	-	-	-	-
IDC-5020	-	-	ER	13	0.630 [16.0]	0.472 [12.0]	500	-	-	-	-
IDC-7328	-	-	ER	13	0.945 [24.0]	0.945 [24.0]	250	-	-	-	-
IDCS-2512	-	-	ER	13	0.630 [16.0]	0.315 [8.0]	2000	-	-	-	-
IDCS-5020	-	-	ER	13	0.630 [16.0]	0.472 [12.0]	500	-	-	-	-
IDCS-7328	-	-	ER	13	0.945 [24.0]	0.945 [24.0]	250	-	-	-	-
IDCP-1813	-	-	ER	13	0.472 [12.0]	0.315 [8.0]	2000	-	-	-	-
IDCP-2218	-	-	ER	13	0.472 [12.0]	0.315 [8.0]	1500	-	-	-	-
IDCP-3114	-	-	ER	13	0.630 (16.0)	0.472 [12.0]	1000	-	-	-	-
IDCP-3020	-	-	ER	13	0.630 (16.0)	0.472 [12.0]	1000	-	-	-	-
IDCP-3722	-	-	ER	13	0.945 [24.0]	0.472 [12.0]	500	-	-	-	-
IDCP-3916	-	-	ER	13	0.945 [24.0]	0.472 [12.0]	500	-	-	-	-

TAPE AND REEL in inches [millimeters]

MODEL	PACKAGE CODE			REEL SIZE	CARRIER TAPE WIDTH (W)	COMPONENT PITCH (P)	UNITS/ REEL	PACKAGE CODE			UNITS/ BULK
	PREVIOUS CODE	GLOBAL CODE LEAD (Pb)-BEARING	GLOBAL CODE LEAD (Pb)-FREE					PREVIOUS CODE	GLOBAL CODE LEAD (Pb)-BEARING	GLOBAL CODE LEAD (Pb)-FREE	
IFCB-0402	-	-	ER	7	0.315 [8.0]	0.079 [2.0]	10 000	-	-	-	-
ILC-0402	-	-	ER	7	0.315 [8.0]	0.079 [2.0]	10 000	-	-	-	-
ILC-0603	-	-	ER	7	0.315 [8.0]	0.157 [4.0]	4000	-	-	-	-
ILC-0805	-	-	ER	7	0.315 [8.0]	0.157 [4.0]	4000	-	-	-	-
IMC-0402	-	-	ER	7	0.315 [8.0]	0.079 [2.0]	10 000	-	-	-	-
IMC-0402-01	-	-	ER	7	0.315 [8.0]	0.079 [2.0]	10 000	-	-	-	-
IMC-0603	-	-	ER	7	0.315 [8.0]	0.157 [4.0]	4000	-	-	-	-
IMC-0603-01	-	-	ER	7	0.315 [8.0]	0.079 [2.0]	3000	-	-	-	-
IMC-0805	-	-	ER	7	0.315 [8.0]	0.157 [4.0]	3000	-	-	-	-
IMC-0805-01	-	-	ER	7	0.315 [8.0]	0.157 [4.0]	2000	-	-	-	-
IMC-1008	-	-	ER	7	0.315 [8.0]	0.157 [4.0]	2000	-	-	-	-
IMC-1210	R98/RB3 R99/RB4	SY/AN SZ/R9	ER/ET ES/EU	7 13	0.315 [8.0] 0.315 [8.0]	0.157 [4.0] 0.157 [4.0]	2000 7500	B13	BN	EB	500
IMC-1210-100	R98/RB3 R99/RB4	SY/AN SZ/R9	ER/ET ES/EU	7 13	0.315 [8.0] 0.315 [8.0]	0.157 [4.0] 0.157 [4.0]	2000 7500	B13	BN	EB	500
IMC-1812	R73/R92 R13/R91	RV/RX RQ/RW	ER/ET ES/EU	7 13	0.472 [12.0] 0.472 [12.0]	0.315 [8.0] 0.315 [8.0]	500 2000	B13	BN	EB	500
IMCH-1812	-	-	ER	7	0.472 [12.0]	0.315 [8.0]	500	-	-	-	-
IMC-2220	-	-	ER	13	0.630 [16.0]	0.472 [12.0]	1000	-	-	-	-
ISC-1008	-	-	ER	13	0.472 [12.0]	0.157 [4.0]	750	-	-	-	-
ISC-1210	R98/RB3 R99/RB4	SY/AN SZ/R9	ER/ET ES/EU	7 13	0.315 [8.0] 0.315 [8.0]	0.157 [4.0] 0.157 [4.0]	2000 7500	B13	BN	EB	500
ISC-1812	R73/R92 R13/R91	RV/RX RQ/RW	ER/ET ES/EU	7 13	0.472 [12.0] 0.472 [12.0]	0.315 [8.0] 0.315 [8.0]	500 2000	B13	BN	EB	500
ICM-0805	-	-	ER	7	0.315 [8.0]	0.157 [4.0]	2000	-	-	-	-
ICM-1206	-	-	ER	7	0.315 [8.0]	0.157 [4.0]	2000	-	-	-	-
ICM-2824	-	-	ER	13	0.630 [16.0]	0.472 [12.0]	2000	-	-	-	-
ICM-3528	-	-	ER	13	0.945 [24.0]	0.472 [12.0]	900	-	-	-	-
ICM-4743	-	-	ER	13	0.945 [24.0]	0.630 [16.0]	500	-	-	-	-
ILSB-0603	-	-	ER	7	0.315 [8.0]	0.157 [4.0]	4000	-	-	-	-
ILSB-0805 (0.047 µH to 2.2 µH)	-	-	ER	7	0.315 [8.0]	0.157 [4.0]	4000	-	-	-	-
ILSB-0805 (2.7 µH to 33 µH)	-	-	ER	7	0.315 [8.0]	0.157 [4.0]	3000	-	-	-	-
ILSB-1206	-	-	ER	7	0.315 [8.0]	0.157 [4.0]	3000	-	-	-	-
ILBB-0402	-	-	ER	7	0.315 [8.0]	0.157 [4.0]	10 000	-	-	-	-
ILBB-0603	-	-	ER	7	0.315 [8.0]	0.157 [4.0]	4000	-	-	-	-
ILBB-0805	-	-	ER	7	0.315 [8.0]	0.157 [4.0]	4000	-	-	-	-
ILB-1206	- -	- -	ER ES	7 13	0.315 [8.0] 0.315 [8.0]	0.157 [4.0] 0.157 [4.0]	3000 10 000	-	-	-	-
ILBB-1210	-	-	ER	7	0.315 [8.0]	0.157 [4.0]	2000	-	-	-	-
ILBB-1806	-	-	ER	7	0.472 [12.0]	0.157 [4.0]	2000	-	-	-	-
ILBB-1812	-	-	ER	7	0.472 [12.0]	0.157 [4.0]	1000	-	-	-	-
ILHB-0603	-	-	ER	7	0.315 [8.0]	0.157 [4.0]	4000	-	-	-	-
ILHB-0805	-	-	ER	7	0.315 [8.0]	0.157 [4.0]	4000	-	-	-	-
ILHB-1206	-	-	ER	7	0.315 [8.0]	0.157 [4.0]	3000	-	-	-	-
ILHB-1806	-	-	ER	7	0.315 [8.0]	0.157 [4.0]	2000	-	-	-	-
ILHB-1812	-	-	ER	7	0.315 [8.0]	0.157 [4.0]	1000	-	-	-	-
ILAS-1206	-	-	ER	7	0.315 [8.0]	0.157 [4.0]	3000	-	-	-	-
LPE-3325	R94	RY	ER	13	0.945 [24.0]	0.472 [12.0]	1000	S51	SM	EB	10
LPE-4841	R94	RY	ER	13	0.945 [24.0]	0.630 [16.0]	600	S51	SM	EB	10
LPE-5047	R94	RY	ER	13	0.945 [24.0]	0.630 [16.0]	600	S51	SM	EB	10
LPE-6562	R94	RY	ER	13	1.26 [32.0]	0.787 [20.0]	300	S51	SM	EB	10
LPE-6855	R94	RY	ER	13	1.26 [32.0]	0.787 [20.0]	450	S51	SM	EB	10
LPE-3325-CST	-	-	ER	13	0.945 [24.0]	0.472 [12.0]	1000	-	-	EB	10
LPT-3535	RC5	RH	ER	13	0.945 [24.0]	0.630 [16.0]	600	S51	SM	EB	10
LPT-4545	RC5	RH	ER	13	0.945 [24.0]	0.630 [16.0]	600	S51	SM	EB	10

IHLP PACKAGING

COMPONENT PHOTO

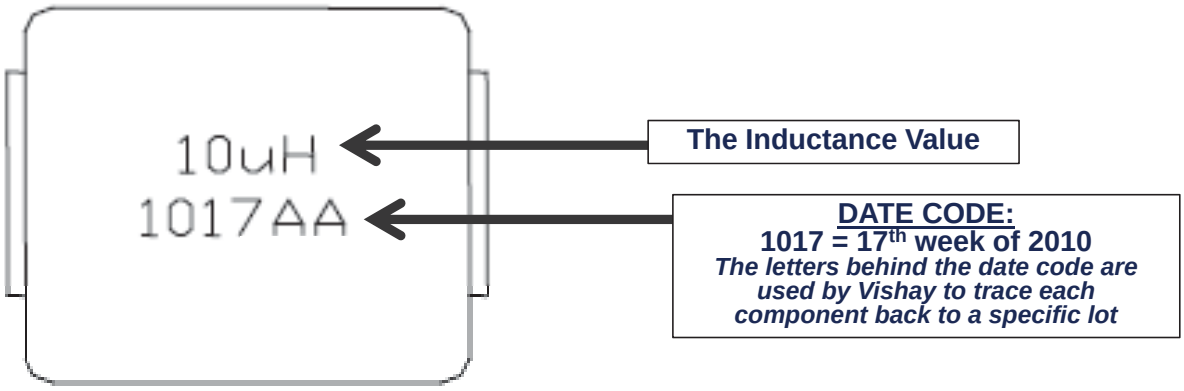
POCKET TAPE PHOTO

REEL PHOTO

CONTAINER PHOTO

UNIT LOAD PHOTO

IHLP COMPONENT PRINT



Production Part Approval Process

The following PPAP documentation is assembled according to AIAG, 4th Edition PPAP Manual and applicable customer requirements

Terminal Plating Info

Part Number (CUSTOMER)	Part Number (Vishay)	Layer structure with base and coating material used:	Layer thickness and tolerances of the coatings (base material, intermediate layer, final finish)	Kind of Coating or technology (e.g. galvanized, chemically hot tin-plated,..)
Generic PPAP	IHLP3232DZERxxxM5A	Cu - Base Material Ni- Intermediate Later Sn- Finish Layer	CU: 0.203 +/- .0254mm Ni: 1.27um to 3.175um Sn: 4.57um to 6.35 um	Electroplated

Production Part Approval Process

The following PPAP documentation is assembled according to AIAG, 4th Edition PPAP Manual and applicable customer requirements

Cross sectional Photos 3232 Cross Section

3232DZ High Value

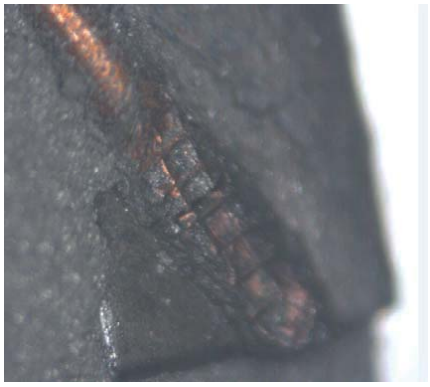
3232DZ Low Value

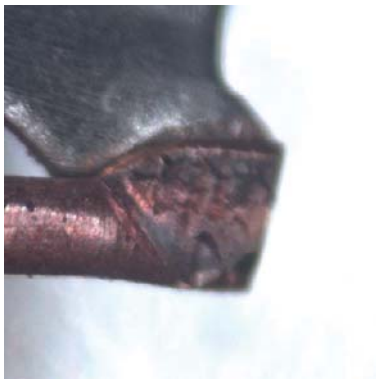
3232CZ High Value

Production Part Approval Process

The following PPAP documentation is assembled according to AIAG, 4th Edition PPAP Manual and applicable customer requirements

Example Photos of IHLP Welds





Production Part Approval Process

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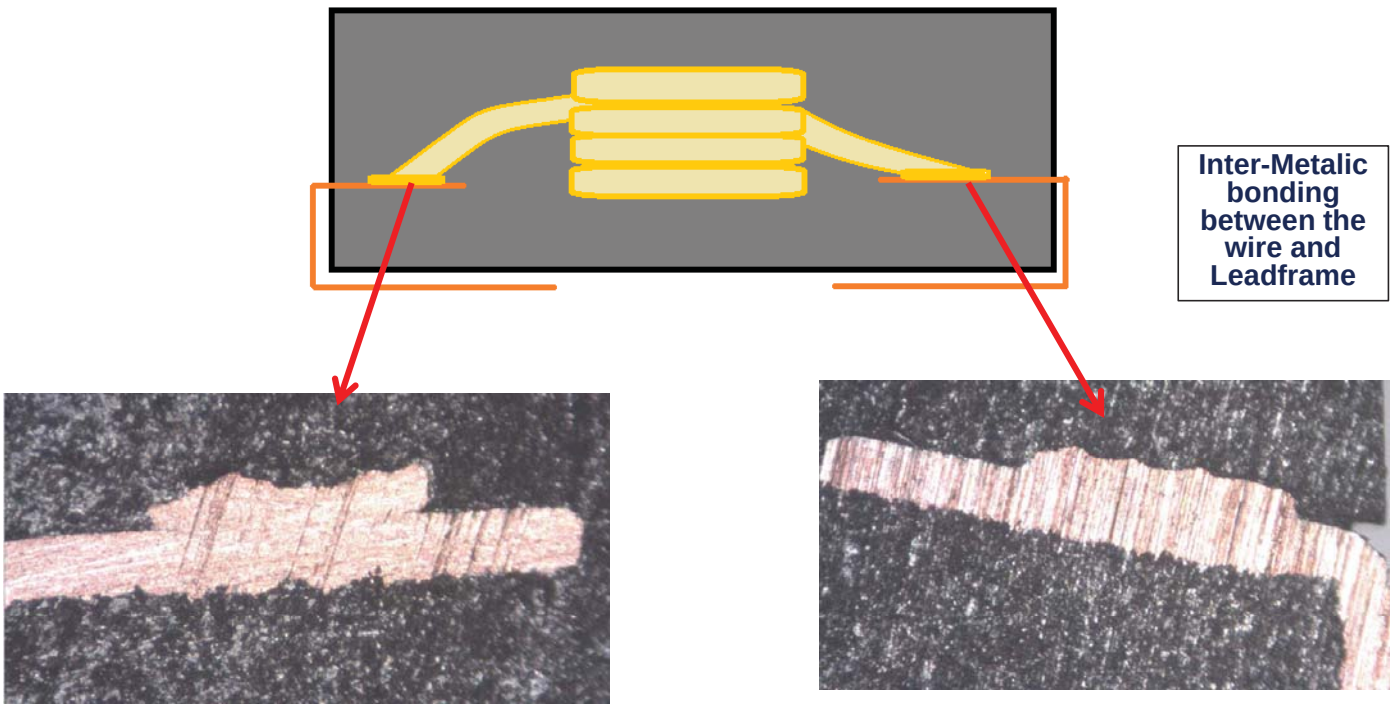
Cross sectional Photos of IHLP Welds



Production Part Approval Process

The following PPAP documentation is assembled according to AIAG, 4th Edition PPAP Manual and applicable customer requirements

Use the control buttons below to navigate through the PPAP sections.

Section 2: Engineering Change Documents

There are no applicable Engineering Change Documents for this part number.

Vishay / Dale Electronics
1505 East Hway 50 Yankton, SD 57078, USA Phone (605) 665-9301 Fax (605) 668-4247

Production Part Approval Process

The following PPAP documentation is assembled according to AIAG, 4th Edition PPAP Manual and applicable customer requirements

Use the control buttons below to navigate through the PPAP sections.

Section 8: Measurement System Analysis

Vishay / Dale Electronics
1505 East Hway 50 Yankton, SD 57078, USA Phone (605) 665-9301 Fax (605) 668-4247

VISHAY

SECTION 9

DIMENSIONAL OUTLINE 3232 DZ

A WORLD OF SOLUTIONS

Production Part Approval Process

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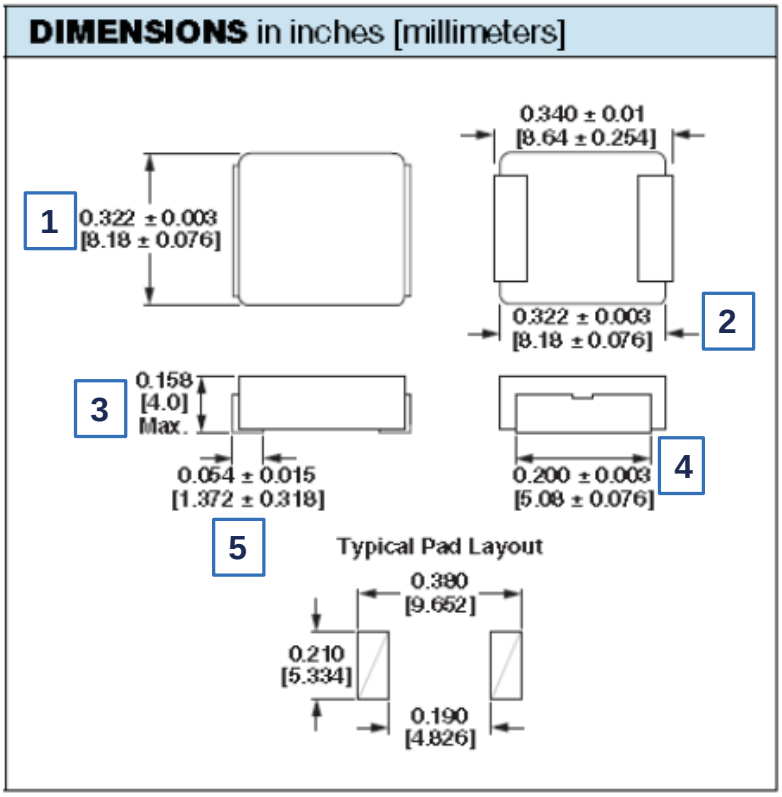
DIMENSIONS in inches [millimeters]



Production Part Approval Process

The following PPAP documentation is assembled according to AIAG, 4th Edition PPAP Manual and applicable customer requirements

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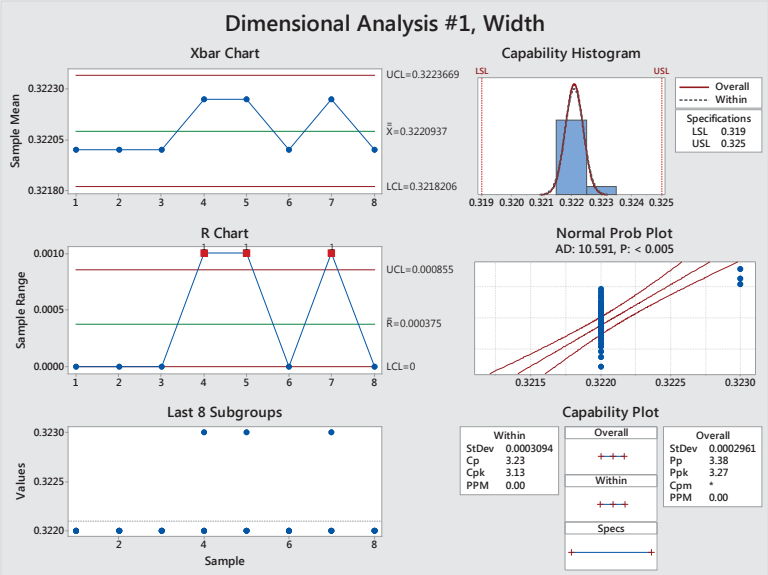
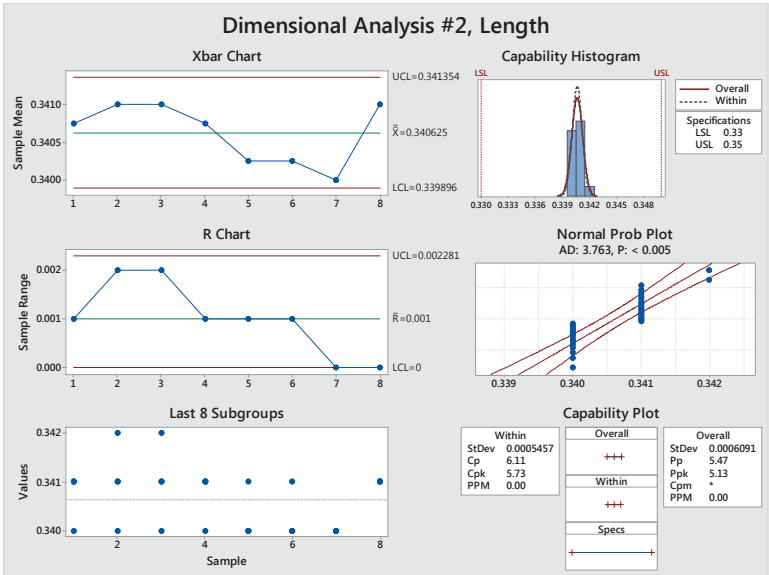
1	0.322	0.341	0.153	0.2	0.057
2	0.322	0.34	0.153	0.2	0.056
3	0.323	0.341	0.153	0.2	0.057
4	0.323	0.341	0.153	0.2	0.056
5	0.323	0.34	0.155	0.2005	0.057
6	0.323	0.342	0.153	0.2	0.055
7	0.322	0.341	0.152	0.2	0.058
8	0.322	0.341	0.153	0.2	0.054
9	0.323	0.341	0.153	0.201	0.057
10	0.323	0.342	0.152	0.2	0.058
11	0.323	0.34	0.152	0.2	0.059
12	0.323	0.341	0.152	0.2	0.055
13	0.322	0.341	0.153	0.2	0.056
14	0.323	0.34	0.154	0.2	0.056
15	0.323	0.341	0.153	0.201	0.055
16	0.322	0.341	0.152	0.2	0.055
17	0.323	0.34	0.153	0.2	0.056
18	0.323	0.34	0.153	0.201	0.056
19	0.323	0.34	0.153	0.2	0.055
20	0.323	0.341	0.154	0.2	0.057
21	0.323	0.34	0.153	0.2	0.055
22	0.323	0.34	0.153	0.2	0.056
23	0.323	0.34	0.154	0.2	0.056
24	0.322	0.341	0.153	0.2	0.057
25	0.322	0.34	0.153	0.2	0.055
26	0.323	0.34	0.153	0.201	0.056
27	0.322	0.34	0.153	0.2	0.056
28	0.323	0.34	0.153	0.2	0.058
29	0.323	0.341	0.153	0.2	0.055
30	0.323	0.341	0.153	0.2	0.055
31	0.323	0.341	0.153	0.2	0.057
32	0.323	0.341	0.153	0.2	0.058

Production Part Approval Process

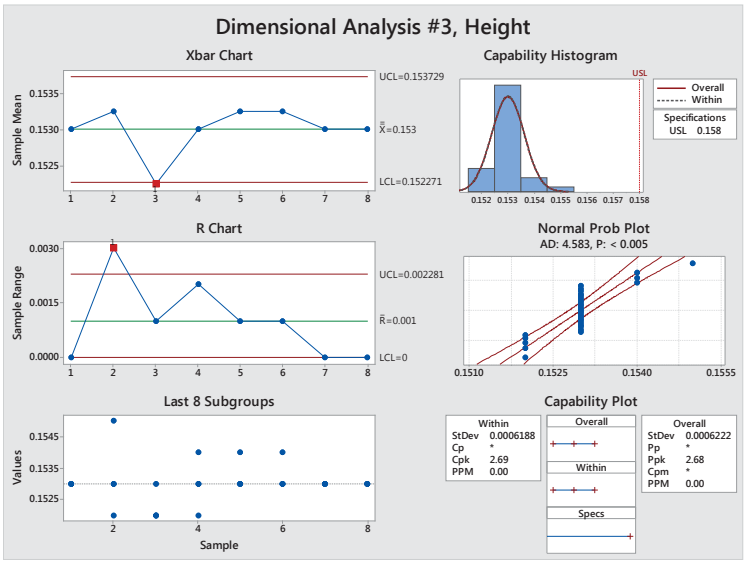
The following PPAP documentation is assembled according to AIAG, 4th Edition PPAP Manual and applicable customer requirements

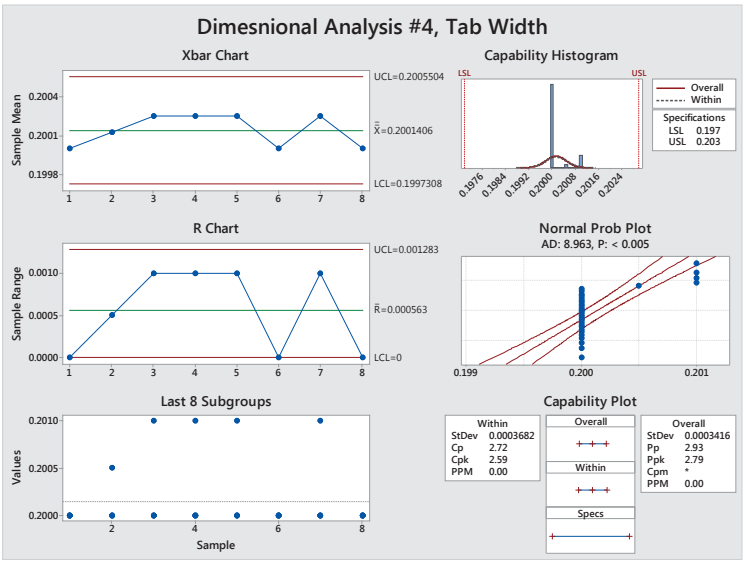




Production Part Approval Process

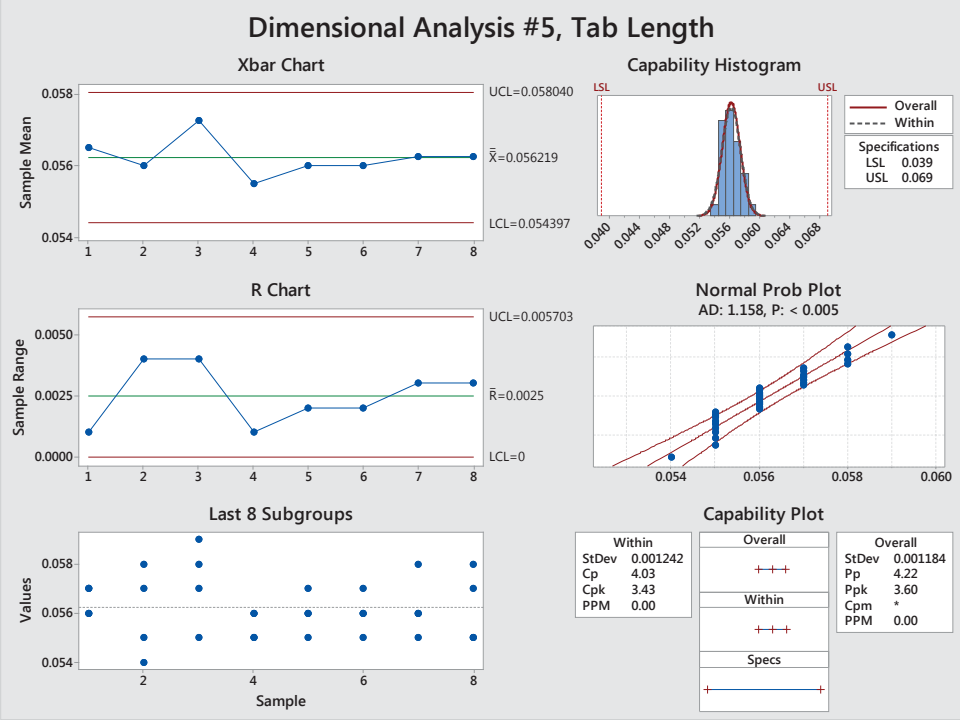
The following PPAP documentation is assembled according to AIAG, 4th Edition PPAP Manual and applicable customer requirements





Production Part Approval Process

The following PPAP documentation is assembled according to AIAG, 4th Edition PPAP Manual and applicable customer requirements



VISHAY

SECTION 10

IHLP3232-5A TEST RESULTS

A WORLD OF SOLUTIONS

IHLP3232DZER1R0M5A

Test #	Description	Ref. Spec. Meth / Cond	Test Conditions	End Point Δ requirements	Sample Size	Meas Temp							
0	3x reflow Preconditioning for lead-free products	ICP 10,373	As specified in sections 6.3 thru 6.4 except Visual per DPS-11,865 10X magnification										
1	Pre- and Post-Stress Electrical Test	IHLP Data Sheet	L (uH) – 100KHz and 250mV DCR – 25°C Ambient	L=±15% of initial, DCR =±15% of initial	All tests requiring electrical data								
3	High Temp Exposure	IEC-60068 Part 2-2 test group BA	155C for 2000 hours, unpowered readings at 0, 250, 500, 1000 and 2000 hour intervals. Initial (0 hr.) and final (2000 hr.) readings at LT/RT/HT LT=Low Temperature=-55°C, RT=Room Temperature=+25°C,HT=High Temperature=+125°C for –A1/1A models. HT=High Temperature =+155° C for -5A models.	L=±20% of initial, DCR =±20% of initial	77			Inductance (µH)			DC Resistance (mΩ)		
								Initial	Final	%Δ	Initial	Final	%Δ
						-55 deg. C	Maximum	1.161	1.262	9.987	3.310	3.292	1.639
							Mimimum	1.058	1.095	3.330	3.193	3.204	-1.482
							Mean	1.122	1.210	7.864	3.241	3.250	0.266
							Std Dev	0.021	0.031	1.430	0.025	0.020	0.747
						+25 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	1.167	1.275	10.674	4.730	4.728	0.838
							Mimimum	1.066	1.107	3.603	4.602	4.608	-1.059
							Mean	1.129	1.224	8.411	4.662	4.667	0.122
							Std Dev	0.022	0.031	1.521	0.027	0.027	0.336
						+155 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	1.164	1.307	14.277	7.010	7.091	2.224
							Mimimum	1.073	1.137	5.929	6.811	6.832	-0.869
							Mean	1.127	1.257	11.547	6.918	6.958	0.590
							Std Dev	0.022	0.032	1.705	0.050	0.054	0.739

IHLP3232DZER1R0M5A

								Inductance (µH)			DC Resistance (mΩ)		
								Initial	Final	%Δ	Initial	Final	%Δ
	Low Temperature Storage	EC-60068 Part 2-1 test group Aa	-55°C for 2000 hours unpowered readings at 0, 250, 500, 1000 and 2000 hour intervals. Initial (0 hr.) and final (2000 hr.) readings at LT/RT/H	L=±20% of initial, DCR =±20% of initial	77	-55 deg. C	Maximum	1.167	1.165	0.415	3.318	3.340	2.268
							Mimimum	1.044	1.044	-0.285	3.212	3.258	-0.241
							Mean	1.117	1.118	0.034	3.256	3.298	1.300
							Std Dev	0.021	0.021	0.159	0.023	0.020	0.529
						+25 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	1.172	1.169	0.371	4.724	4.772	1.995
							Mimimum	1.051	1.051	-0.533	4.610	4.671	0.322
							Mean	1.124	1.123	-0.090	4.668	4.720	1.111
							Std Dev	0.021	0.021	0.169	0.027	0.026	0.275
						+155 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	1.168	1.171	0.655	7.061	7.155	3.706
							Mimimum	1.054	1.057	-0.136	6.788	6.889	0.408
							Mean	1.120	1.122	0.211	6.929	7.046	1.702
							Std Dev	0.020	0.020	0.128	0.056	0.061	0.656

IHLP3232DZER1R0M5A

								Inductance (µH)			DC Resistance (mΩ)		
								Initial	Final	%Δ	Initial	Final	%Δ
4	Temperature Cycling	IEC-60068, Part 2.14 test group Na	-55°C to +125°C (+155° C for -5A models) dwell time = 30 min. transfer time ≤10 sec. no. of cycles = 1000 unpowered initial (0 cycles) and final 1000 cycles). Readings at LT/RT/HT	L=±20% of initial, DCR =±20% of initial	77	-55 deg. C	Maximum	1.150	1.214	5.893	3.323	3.324	2.616
							Mimimum	1.064	1.116	3.069	3.202	3.208	-1.938
							Mean	1.114	1.166	4.660	3.246	3.264	0.575
							Std Dev	0.016	0.018	0.608	0.025	0.024	0.851
						+25 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	1.153	1.222	6.172	4.722	4.736	1.159
							Mimimum	1.070	1.130	3.830	4.598	4.627	-0.340
							Mean	1.121	1.178	5.079	4.657	4.678	0.444
							Std Dev	0.016	0.017	0.608	0.026	0.023	0.240
						+155 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	1.143	1.246	9.256	7.039	7.099	2.263
							Mimimum	1.060	1.153	6.411	6.812	6.847	-0.618
							Mean	1.115	1.202	7.846	6.917	6.984	0.966
							Std Dev	0.016	0.018	0.713	0.047	0.052	0.555

								Inductance (µH)			DC Resistance (mΩ)		
								Initial	Final	%Δ	Initial	Final	%Δ
7	Biased Humidity	IEC-60068 Part 2-67	Temperature = 85°C ±20°C Humidity = 85% ±5% RH Duration = 1000 hours Power = No Power Initial (0hr.) and final (1000hr.) readings at LT/RT/HT	L=±20% of initial, DCR =±20% of initial	77	-55 deg. C	Maximum	1.150	1.139	-0.310	3.370	3.334	2.778
							Mimimum	1.069	1.050	-2.082	3.197	3.220	-3.591
							Mean	1.113	1.102	-0.986	3.251	3.275	0.775
							Std Dev	0.021	0.022	0.401	0.029	0.024	1.035
						+25 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	1.160	1.146	-0.383	4.729	4.739	0.756
							Mimimum	1.079	1.059	-2.292	4.610	4.622	0.000
							Mean	1.123	1.109	-1.238	4.671	4.689	0.397
							Std Dev	0.021	0.022	0.405	0.025	0.024	0.147
						+155 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	1.152	1.154	0.843	7.073	7.092	2.186
							Mimimum	1.069	1.064	-1.125	6.839	6.874	-0.142
							Mean	1.115	1.114	-0.130	6.934	6.999	0.930
							Std Dev	0.020	0.022	0.420	0.051	0.044	0.603

IHLP3232DZER1R0M5A

								Inductance (µH)			DC Resistance (mΩ)		
								Initial	Final	%Δ	Initial	Final	%Δ
8	Operational Life	MIL-STD-202, Method 108A	Temperature = 85°C for -1A/A1 models. Temperature =115° C for -5A models. Duration = 2000hrs. Power = As noted on the test request. Readings a 0, 250, 500, 1000 and 2000 hour intervals. Initial (0 hr.) and final (2000 hr.) readings at LT/RT/HT	L=±20% of initial, DCR =±20% of initial	77	-55 deg. C	Maximum	1.132	1.204	8.533	3.325	3.375	3.846
							Mimimum	1.040	1.072	0.770	3.192	3.203	-1.774
							Mean	1.092	1.142	4.574	3.243	3.257	0.452
							Std Dev	0.021	0.034	2.005	0.028	0.029	0.857
						+25 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	1.138	1.220	9.245	4.825	4.825	2.806
							Mimimum	1.046	1.091	1.612	4.610	4.641	-2.093
							Mean	1.099	1.160	5.541	4.698	4.711	0.268
							Std Dev	0.021	0.034	2.037	0.048	0.045	1.060
						+155 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	1.136	1.245	11.768	7.100	7.166	3.230
							Mimimum	1.041	1.115	3.776	6.813	6.827	-1.612
							Mean	1.095	1.184	8.073	6.950	7.006	0.807
							Std Dev	0.021	0.034	2.157	0.054	0.069	0.984

9	External Visual	MIL-STD-883G Method 2009.9	Inspect construction and workmanship.	Pass all criteria as defined in DPS-11,865 VA1	All	na	Pass
10	Physical Dimensions	JESD22 Method JB-100	Verify physical dimensions per part specification	All parts within dimensional tolerance per data sheet	30	na	Pass
12	Resistance to Solvents	MIL-STD-202G Method 215K	Add Aqueous wash chemical. OKEM Clean or equivalent. Do not use banned solvents.	Pass all criteria as defined in DPS-11,865 VA1 L=±20% of initial, DCR =±20% of initial	5	na	Pass

IHLP3232DZER1R0M5A

								Inductance (µH)			DC Resistance (mΩ)		
								Initial	Final	%Δ	Initial	Final	%Δ
13	Mechanical Shock	IEC-60068 part 2.27 test group Ea with precondition per 0 above	Pulse Shape-Half Sine Normal Pulse Length 6ms Peak acceleration-100g No. shocks-6 each in both directions of each axis (total of 36) Initial and final readings at LT/RT/HT	L=±20% of initial, DCR =±20% of initial	30	-55 deg. C	Maximum	1.126	1.126	0.461	3.306	3.307	1.271
							Mimimum	1.063	1.064	-0.039	3.214	3.238	-0.458
							Mean	1.091	1.092	0.142	3.247	3.267	0.617
							Std Dev	0.015	0.015	0.111	0.019	0.016	0.392
						+25 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	1.133	1.130	0.348	4.734	4.740	0.471
							Mimimum	1.072	1.072	-0.204	4.634	4.637	-0.951
							Mean	1.099	1.100	0.078	4.674	4.679	0.108
							Std Dev	0.015	0.015	0.142	0.022	0.021	0.258
						+155 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	1.127	1.127	0.224	7.037	7.105	2.382
							Mimimum	1.073	1.073	-0.041	6.822	6.928	0.143
							Mean	1.099	1.100	0.074	6.950	7.007	0.820
							Std Dev	0.014	0.014	0.069	0.046	0.038	0.643
								Inductance (µH)			DC Resistance (mΩ)		
								Initial	Final	%Δ	Initial	Final	%Δ
14	Vibration	IEC-60068 PART 2-6 TEST GROUP Fc. With precondition per 0 above	Pulse Shape-sine wave range of frequency 1 10-55Hz. Amplitude ±0.75mm Range of frequency 2 55-2000Hz Amplitude; 10G Frequency Sweep: 1 oct./min. Duration: 24 h each of 3 axis. Initial and final readings at LT/RT/HT	L=±20% of initial, DCR =±20% of initial	30	-55 deg. C	Maximum	1.110	1.112	0.322	3.285	3.309	1.441
							Mimimum	1.040	1.040	-0.260	3.208	3.233	-0.764
							Mean	1.075	1.076	0.105	3.248	3.266	0.553
							Std Dev	0.019	0.019	0.168	0.021	0.018	0.558
						+25 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	1.119	1.118	0.446	4.723	4.795	2.108
							Mimimum	1.045	1.045	-0.342	4.630	4.695	0.746
							Mean	1.084	1.084	0.015	4.670	4.739	1.466
							Std Dev	0.019	0.019	0.183	0.027	0.028	0.315
						+155 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	1.112	1.114	0.568	7.037	7.062	1.893
							Mimimum	1.038	1.040	-0.129	6.867	6.854	-0.982
							Mean	1.080	1.082	0.222	6.950	6.968	0.262
							Std Dev	0.018	0.018	0.204	0.049	0.057	0.781

IHLP3232DZER1R0M5A

								Inductance (µH)			DC Resistance (mΩ)		
								Initial	Final	%Δ	Initial	Final	%Δ
	Bump	IEC-60068 part 2-29 test group Eb with precondition per 0 above.	Pulse shape: half sine Nominal pulse length: 6 ms Peak Acceleration: 40g No. of shocks: 4000 each mechanical axis.Initial and final readings at LT/RT/HT	L=±20% of initial, DCR =±20% of initial	30	-55 deg. C	Maximum	1.126	1.131	0.579	3.331	3.287	-0.152
							Mimimum	1.062	1.066	-0.433	3.231	3.210	-1.637
							Mean	1.094	1.096	0.180	3.277	3.250	-0.835
							Std Dev	0.018	0.018	0.222	0.026	0.020	0.387
						+25 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	1.133	1.136	0.547	4.734	4.746	0.554
							Mimimum	1.072	1.073	-0.406	4.627	4.634	-0.043
							Mean	1.101	1.102	0.075	4.682	4.693	0.231
							Std Dev	0.018	0.018	0.222	0.026	0.028	0.159
						+155 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	1.135	1.136	0.430	7.048	7.071	0.935
							Mimimum	1.070	1.071	-0.154	6.893	6.905	-0.241
							Mean	1.100	1.101	0.107	6.971	6.989	0.263
							Std Dev	0.018	0.018	0.144	0.039	0.040	0.286
								Inductance (µH)			DC Resistance (mΩ)		
								Initial	Final	%Δ	Initial	Final	%Δ
15	Resistance to Solder Heat	MIL-STD-202G Method 210F Condition K	IR/convection reflow. 250 ± 5°C for 30 ± 5sec. Ramp rate 1°C/s to 4°C/; Above 183°C for 90s-120s	L=±20% of initial, DCR =±20% of initial	30	+25 deg. C	Maximum	1.140	1.145	1.249	4.745	4.731	0.086
							Mimimum	1.054	1.057	-1.842	4.664	4.657	-0.654
							Mean	1.109	1.109	0.001	4.706	4.694	-0.253
							Std Dev	0.020	0.019	0.949	0.020	0.019	0.159
								Inductance (µH)			DC Resistance (mΩ)		
								Initial	25KV	%Δ	Initial	25KV	%Δ
17	ESD	AEC-Q200-002	Determine the Classification of the part.	L=±20% of initial, DCR =±20% of initial	15	+25 deg. C	Maximum	1.127	1.137	1.057	4.700	4.692	-0.108
							Mimimum	1.036	1.041	0.455	4.605	4.594	-0.239
							Mean	1.087	1.095	0.734	4.644	4.635	-0.178
							Std Dev	0.022	0.023	0.177	0.028	0.028	0.040
18	Solderability	J-STD-002C Method B1	4 hours @ 155°C dry heat @ 255°C. 90° dipping angle.	95% or greater coverage on "A" (seating plane) per J-STD-002C	15	NA	Pass						

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								Inductance (µH)			DC Resistance (mΩ)		
								Initial			Initial		
19	Electrical Characterization	User Specification	Min, Max, Mean, and Standard Deviation @ Min (-55C), Room, and Max (+125C) operating temperatures. After mounted, allow +/-5% shift DCR at room temp. -55C/+125C DCR Max calculated using temp conversion for copper: $R_2 = [(T_2 + 234.5) / (234.5 + T_A)] * 1.05R_A$ (A = Ambient, 2 = new con)	Final Test: L=±20% of initial, DCR per calculated limits described in test conditions. L test for -55C & +125C = ±20% initial	30	-55 deg. C	Maximum	1.126			3.331		
						Mimimum	1.062			3.231		
						Mean	1.094			3.277		
						Std Dev	0.018			0.026		
					+25 deg. C		Initial			Initial		
						Maximum	1.133			4.734		
						Mimimum	1.072			4.627		
						Mean	1.101			4.682		
						Std Dev	0.018			0.026		
					+155 deg. C		Initial			Initial		
						Maximum	1.135			7.048		
						Mimimum	1.070			6.893		
						Mean	1.100			6.971		
						Std Dev	0.018			0.039		
								Inductance (µH)			DC Resistance (mΩ)		
								Initial	Final	%Δ	Initial	Final	%Δ
21	Board Flex	AEC-Q200-005 Appendix 2	2mm minimum flex for 60 (+5) sec	Pass all criteria as defined in DPS-11,865 VA1 L=±20% of initial, DCR =±20% of initial	30	+25 deg. C	Maximum	1.155	1.155	1.567	4.725	4.758	0.880
							Mimimum	1.045	1.048	-0.066	4.597	4.630	0.299
							Mean	1.106	1.109	0.278	4.669	4.700	0.666
							Std Dev	0.026	0.026	0.289	0.036	0.037	0.148
								Inductance (µH)			DC Resistance (mΩ)		
								Initial	Final	%Δ	Initial	Final	%Δ
22	Terminal Strength	AEC-Q200-006 Appendix 1	Force of 1.8kg (17.7 N) for 60 seconds	Pass all criteria as defined in DPS-11,865 VA1 L=±20% of initial, DCR =±20% of initial	30	+25 deg. C	Maximum	1.127	1.133	0.598	4.666	4.648	-0.282
							Mimimum	1.048	1.051	0.115	4.579	4.558	-0.585
							Mean	1.094	1.099	0.390	4.627	4.607	-0.421
							Std Dev	0.021	0.021	0.104	0.026	0.026	0.074

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Test #	Description	Ref. Spec. Meth / Cond	Test Conditions	End Point Δ requirements	Sample Size	Meas Temp							
0	3x reflow Preconditioning for lead-free products	ICP 10,373	As specified in sections 6.3 thru 6.4 except Visual per DPS-11,865 10X magnification										
1	Pre- and Post-Stress Electrical Test	IHLP Data Sheet	L (uH) – 100KHz and 250mV DCR – 25°C Ambient	L=±15% of initial, DCR =±15% of initial	All tests requiring electrical data								
3	High Temp Exposure	IEC-60068 Part 2-2 test group BA	155C for 2000 hours, unpowered readings at 0, 250, 500, 1000 and 2000 hour intervals. Initial (0 hr.) and final (2000 hr.) readings at LT/RT/HT LT=Low Temperature=-55°C, RT=Room Temperature=+25°C,HT=High Temperature=+125°C for –A1/1A models. HT=High Temperature =+155° C for -5A models.	L=±20% of initial, DCR =±20% of initial	77			Inductance (µH)			DC Resistance (mΩ)		
								Initial	Final	%Δ	Initial	Final	%Δ
						-55 deg. C	Maximum	34.186	35.837	7.860	105.900	105.990	1.757
							Mimimum	30.165	32.199	4.415	103.120	103.440	-1.558
							Mean	32.214	33.890	5.210	104.195	104.331	0.133
							Std Dev	0.705	0.667	0.543	0.586	0.533	0.672
						+25 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	34.369	36.087	8.236	149.940	150.960	1.528
							Mimimum	30.260	32.378	4.602	147.730	149.110	-0.060
							Mean	32.378	34.103	5.336	148.941	149.995	0.709
							Std Dev	0.728	0.681	0.562	0.493	0.405	0.306
						+155 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	34.099	36.782	10.456	229.600	227.900	0.756
							Mimimum	30.205	33.025	7.258	224.600	223.000	-2.134
							Mean	32.157	34.770	8.130	227.458	226.260	-0.525
							Std Dev	0.739	0.744	0.563	1.189	1.044	0.646

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								Inductance (µH)			DC Resistance (mΩ)		
								Initial	Final	%Δ	Initial	Final	%Δ
	Low Temperature Storage	EC-60068 Part 2-1 test group Aa	-55°C for 2000 hours unpowered readings at 0, 250, 500, 1000 and 2000 hour intervals. Initial (0 hr.) and final (2000 hr.) readings at LT/RT/H	L=±20% of initial, DCR =±20% of initial	77	-55 deg. C	Maximum	33.897	33.999	0.545	105.800	107.170	3.186
							Mimimum	30.603	30.532	-0.507	103.280	104.980	-0.181
							Mean	32.203	32.228	0.072	104.406	105.889	1.423
							Std Dev	0.793	0.845	0.255	0.635	0.581	0.846
						+25 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	34.044	34.106	0.458	151.640	152.790	1.929
							Mimimum	30.631	30.543	-0.613	148.780	150.270	-0.126
							Mean	32.334	32.327	-0.024	150.084	151.301	0.811
							Std Dev	0.821	0.873	0.258	0.552	0.547	0.372
						+155 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	33.838	33.884	0.489	229.900	229.800	1.423
							Mimimum	30.185	30.204	0.003	224.300	224.900	-1.223
							Mean	31.990	32.021	0.099	227.496	227.442	-0.021
							Std Dev	0.904	0.907	0.062	1.259	1.058	0.650

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								Inductance (µH)			DC Resistance (mΩ)		
								Initial	Final	%Δ	Initial	Final	%Δ
4	Temperature Cycling	IEC-60068, Part 2.14 test group Na	-55°C to +125°C (+155° C for -5A models) dwell time = 30 min. transfer time ≤10 sec. no. of cycles = 1000 unpowered initial (0 cycles) and final 1000 cycles). Readings at LT/RT/HT	L=±20% of initial, DCR =±20% of initial	77	-55 deg. C	Maximum	34.180	34.660	3.273	106.350	106.060	1.824
							Mimimum	30.040	30.490	0.982	102.980	103.130	-1.881
							Mean	31.824	32.397	1.807	104.218	104.437	0.213
							Std Dev	0.727	0.676	0.409	0.681	0.627	0.794
						+25 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	34.496	34.902	3.215	151.500	150.930	1.194
							Mimimum	30.092	30.571	0.979	148.460	148.230	-1.094
							Mean	31.975	32.527	1.732	150.122	149.940	-0.120
							Std Dev	0.742	0.688	0.392	0.608	0.485	0.416
						+155 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	34.370	35.585	5.008	229.200	228.500	0.979
							Mimimum	29.466	30.856	3.215	223.200	222.900	-1.629
							Mean	31.713	32.968	3.964	227.075	226.140	-0.410
							Std Dev	0.750	0.723	0.348	1.425	1.291	0.538

								Inductance (µH)			DC Resistance (mΩ)		
								Initial	Final	%Δ	Initial	Final	%Δ
7	Biased Humidity	IEC-60068 Part 2-67	Temperature = 85°C ±20°C Humidity = 85% ±5% RH Duration = 1000 hours Power = No Power Initial (0hr.) and final (1000hr.) readings at LT/RT/HT	L=±20% of initial, DCR =±20% of initial	77	-55 deg. C	Maximum	34.489	34.473	1.018	105.740	107.500	3.506
							Mimimum	30.441	30.314	-1.200	102.170	104.030	0.134
							Mean	32.041	31.967	-0.233	104.146	105.583	1.383
							Std Dev	0.847	0.861	0.336	0.669	0.629	0.769
						+25 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	34.763	34.633	0.066	151.190	154.120	2.546
							Mimimum	30.583	30.462	-1.142	148.140	149.600	-0.013
							Mean	32.225	32.116	-0.338	149.776	152.023	1.501
							Std Dev	0.875	0.879	0.263	0.604	0.862	0.505
						+155 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	34.623	34.646	1.841	229.400	229.500	1.381
							Mimimum	30.460	30.120	-3.125	224.200	223.600	-1.541
							Mean	32.093	32.126	0.104	227.417	227.132	-0.123
							Std Dev	0.872	0.904	0.501	1.341	1.241	0.628

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								Inductance (µH)			DC Resistance (mΩ)		
								Initial	Final	%Δ	Initial	Final	%Δ
8	Operational Life	MIL-STD-202, Method 108A	Temperature = 85°C for -1A/A1 models. Temperature =115° C for -5A models. Duration = 2000hrs. Power = As noted on the test request. Readings a 0, 250, 500, 1000 and 2000 hour intervals. Initial (0 hr.) and final (2000 hr.) readings at LT/RT/HT	L=±20% of initial, DCR =±20% of initial	77	-55 deg. C	Maximum	33.908	34.863	5.356	105.620	106.450	2.140
							Mimimum	30.700	31.738	1.811	103.180	103.130	-1.635
							Mean	32.130	33.133	3.126	104.123	104.354	0.223
							Std Dev	0.697	0.678	0.722	0.504	0.726	0.733
						+25 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	34.091	35.202	5.677	154.230	150.830	0.610
							Mimimum	30.874	32.015	2.309	148.880	146.810	-3.070
							Mean	32.293	33.446	3.578	150.866	149.699	-0.767
							Std Dev	0.710	0.691	0.660	1.193	0.653	0.937
						+155 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	33.942	35.795	8.107	229.400	229.600	1.684
							Mimimum	30.632	32.390	4.093	223.600	223.600	-2.182
							Mean	32.021	33.903	5.883	227.100	226.527	-0.249
							Std Dev	0.727	0.739	0.853	1.357	1.649	0.853

9	External Visual	MIL-STD-883G Method 2009.9	Inspect construction and workmanship.	Pass all criteria as defined in DPS-11,865 VA1	All	na	Pass
10	Physical Dimensions	JESD22 Method JB-100	Verify physical dimensions per part specification	All parts within dimensional tolerance per data sheet	30	na	Pass
12	Resistance to Solvents	MIL-STD-202G Method 215K	Add Aqueous wash chemical. OKEM Clean or equivalent. Do not use banned solvents.	Pass all criteria as defined in DPS-11,865 VA1 L=±20% of initial, DCR =±20% of initial	5	na	Pass

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								Inductance (µH)			DC Resistance (mΩ)		
								Initial	Final	%Δ	Initial	Final	%Δ
13	Mechanical Shock	IEC-60068 part 2.27 test group Ea with precondition per 0 above	Pulse Shape-Half Sine Normal Pulse Length 6ms Peak acceleration-100g No. shocks-6 each in both directions of each axis (total of 36) Initial and final readings at LT/RT/HT	L=±20% of initial, DCR =±20% of initial	30	-55 deg. C	Maximum	33.640	33.707	0.398	106.060	107.050	1.358
							Mimimum	30.832	30.828	-0.235	104.450	105.060	0.237
							Mean	32.024	32.064	0.121	105.180	105.898	0.683
							Std Dev	0.738	0.763	0.181	0.452	0.509	0.296
						+25 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	33.821	33.857	0.292	153.660	151.960	-0.434
							Mimimum	30.975	30.897	-0.502	150.940	149.440	-1.128
							Mean	32.197	32.160	-0.117	152.404	151.117	-0.844
							Std Dev	0.769	0.794	0.197	0.617	0.537	0.169
						+155 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	33.705	33.728	0.157	228.400	228.200	0.000
							Mimimum	30.657	30.705	-0.040	225.100	224.700	-0.439
							Mean	31.945	31.977	0.100	227.173	226.927	-0.109
							Std Dev	0.801	0.797	0.036	0.776	0.869	0.099

								Inductance (µH)			DC Resistance (mΩ)		
								Initial	Final	%Δ	Initial	Final	%Δ
14	Vibration	IEC-60068 PART 2-6 TEST GROUP Fc. With precondition per 0 above	Pulse Shape-sine wave range of frequency 1 10-55Hz. Amplitude ±0.75mm Range of frequency 2 55-2000Hz Amplitude; 10G Frequency Sweep: 1 oct./min. Duration: 24 h each of 3 axis. Initial and final readings at LT/RT/HT	L=±20% of initial, DCR =±20% of initial	30	-55 deg. C	Maximum	34.252	34.232	0.520	105.800	106.160	0.771
							Mimimum	30.432	30.243	-0.696	104.150	104.550	0.038
							Mean	31.853	31.792	-0.195	104.716	105.032	0.302
							Std Dev	0.793	0.840	0.299	0.392	0.484	0.196
						+25 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	34.308	34.232	0.430	150.420	151.830	1.201
							Mimimum	30.477	30.273	-0.806	148.520	150.160	0.588
							Mean	31.971	31.866	-0.332	149.404	150.897	0.999
							Std Dev	0.818	0.860	0.274	0.435	0.382	0.110
						+155 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	33.902	33.942	0.247	227.800	227.900	0.177
							Mimimum	29.930	29.971	0.113	223.900	224.200	-0.310
							Mean	31.596	31.648	0.164	226.453	226.513	0.026
							Std Dev	0.875	0.877	0.031	0.908	0.958	0.097

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								Inductance (µH)			DC Resistance (mΩ)		
								Initial	Final	%Δ	Initial	Final	%Δ
	Bump	IEC-60068 part 2-29 test group Eb with precondition per 0 above.	Pulse shape: half sine Nominal pulse length: 6 ms Peak Acceleration: 40g No. of shocks: 4000 each mechanical axis.Initial and final readings at LT/RT/HT	L=±20% of initial, DCR =±20% of initial	30	-55 deg. C	Maximum	33.694	33.820	0.459	107.620	106.850	0.625
							Mimimum	30.753	30.850	-0.098	105.280	105.480	-1.557
							Mean	32.052	32.126	0.228	106.217	105.968	-0.231
							Std Dev	0.674	0.683	0.140	0.621	0.295	0.652
						+25 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	33.888	33.932	0.206	151.760	152.530	0.667
							Mimimum	30.937	30.952	-0.368	150.270	150.900	0.020
							Mean	32.237	32.223	-0.045	151.192	151.715	0.346
							Std Dev	0.688	0.695	0.154	0.354	0.401	0.256
						+155 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	33.856	33.874	0.051	228.300	230.500	2.177
							Mimimum	30.766	30.762	-0.112	224.700	228.500	0.658
							Mean	32.047	32.035	-0.037	227.077	229.527	1.081
							Std Dev	0.702	0.703	0.030	1.173	0.471	0.493
								Inductance (µH)			DC Resistance (mΩ)		
								Initial	Final	%Δ	Initial	Final	%Δ
15	Resistance to Solder Heat	MIL-STD-202G Method 210F Condition K	IR/convection reflow. 250 ± 5°C for 30 ± 5sec. Ramp rate 1°C/s to 4°C/; Above 183°C for 90s-120s	L=±20% of initial, DCR =±20% of initial	30	+25 deg. C	Maximum	33.305	33.682	2.104	152.910	152.330	-0.243
							Mimimum	30.738	31.257	0.726	151.880	151.000	-0.677
							Mean	31.948	32.402	1.425	152.391	151.631	-0.499
							Std Dev	0.639	0.577	0.322	0.298	0.360	0.128
								Inductance (µH)			DC Resistance (mΩ)		
								Initial	25KV	%Δ	Initial	25KV	%Δ
17	ESD	AEC-Q200-002	Determine the Classification of the part.	L=±20% of initial, DCR =±20% of initial	15	+25 deg. C	Maximum	33.284	32.008	-3.417	152.770	151.560	-0.363
							Mimimum	29.988	28.369	-11.293	151.270	150.470	-1.080
							Mean	31.820	30.183	-5.138	152.091	151.110	-0.645
							Std Dev	0.868	1.028	2.227	0.450	0.327	0.222
18	Solderability	J-STD-002C Method B1	4 hours @ 155°C dry heat @ 255°C. 90° dipping angle.	95% or greater coverage on "A" (seating plane) per J-STD-002C	15	NA	Pass						

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								Inductance (µH)			DC Resistance (mΩ)		
19	Electrical Characterization	User Specification	Min, Max, Mean, and Standard Deviation @ Min (-55C), Room, and Max (+125C) operating temperatures. After mounted, allow +/-5% shift DCR at room temp. -55C/+125C DCR Max calculated using temp conversion for copper: $R_2 = [(T_2 + 234.5) / (234.5 + T_A)] * 1.05R_A$ (A = Ambient, 2 = new con)	Final Test: L=±20% of initial, DCR per calculated limits described in test conditions. L test for -55C & +125C = ±20% initial	30			Initial			Initial		
						-55 deg. C	Maximum	33.694			107.620		
							Mimimum	30.753			105.280		
							Mean	32.052			106.217		
							Std Dev	0.674			0.621		
								Initial			Initial		
						+25 deg. C	Maximum	33.888			151.760		
							Mimimum	30.937			150.270		
							Mean	32.237			151.192		
							Std Dev	0.688			0.354		
								Initial			Initial		
						+155 deg. C	Maximum	33.856			228.300		
							Mimimum	30.766			224.700		
							Mean	32.047			227.077		
							Std Dev	0.702			1.173		
								Inductance (µH)			DC Resistance (mΩ)		
								Initial	Final	%Δ	Initial	Final	%Δ
21	Board Flex	AEC-Q200-005 Appendix 2	2mm minimum flex for 60 (+5) sec	Pass all criteria as defined in DPS-11,865 VA1 L=±20% of initial, DCR =±20% of initial	30	+25 deg. C	Maximum	33.960	34.260	0.937	152.700	152.500	0.033
							Mimimum	30.398	30.669	0.655	151.280	151.090	-0.524
							Mean	32.267	32.533	0.824	151.967	151.840	-0.084
							Std Dev	0.731	0.737	0.078	0.385	0.364	0.101
								Inductance (µH)			DC Resistance (mΩ)		
								Initial	Final	%Δ	Initial	Final	%Δ
22	Terminal Strength	AEC-Q200-006 Appendix 1	Force of 1.8kg (17.7 N) for 60 seconds	Pass all criteria as defined in DPS-11,865 VA1 L=±20% of initial, DCR =±20% of initial	30	+25 deg. C	Maximum	32.897	33.070	0.667	151.470	150.250	-0.524
							Mimimum	29.679	29.868	-0.105	150.180	148.870	-1.070
							Mean	31.142	31.300	0.506	150.774	149.527	-0.827
							Std Dev	0.779	0.787	0.183	0.324	0.396	0.123

SECTION 10

PERFORMANCE TEST RESULTS

IHLP 3232DZ-5A

BEER'SHEVA MANUFACTURING LOCATION

IHLP3232DZER2R2M5A
IHLP3232DZER330M5A

- Parts were manufactured at the Beer'Sheva, Israel manufacturing location.

IHLP3232DZER2R2M5A

Test #	Description	Ref. Spec. Meth / Cond	Test Conditions	End Point Δ requirements	Sample Size	Meas Temp		Inductance (µH)			DC Resistance (mΩ)		
0	3x reflow Preconditioning for lead-free products	ICP 10,373	As specified in sections 6.3 thru 6.4 except Visual per DPS-11,865 10X magnification										
1	Pre- and Post-Stress Electrical Test	IHLP Data Sheet	L (uH) – 100KHz and 250mV DCR – 25°C Ambient	L=±15% of initial, DCR =±15% of initial	All tests requiring electrical data								
3	High Temp Exposure	IEC-60068 Part 2-2 test group BA	155C for 2000 hours, unpowered readings at 0, 250, 500, 1000 and 2000 hour intervals. Initial (0 hr.) and final (2000 hr.) readings at LT/RT/HT LT=Low Temperature=-55°C, RT=Room Temperature=+25°C,HT=High Temperature=+125°C for –A1/1A models. HT=High Temperature =+155° C for -5A models.	L=±20% of initial, DCR =±20% of initial	77			Initial	Final	%Δ	Initial	Final	%Δ
						-55 deg. C	Maximum	2.125	2.295	11.133	8.064	7.943	-0.231
							Mimimum	1.894	2.070	8.027	7.801	7.560	-3.792
							Mean	1.979	2.168	9.551	7.918	7.801	-1.477
							Std Dev	0.048	0.046	0.621	0.064	0.054	0.755
						+25 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	2.133	2.311	11.467	11.548	11.446	1.125
							Mimimum	1.903	2.082	8.322	11.107	11.148	-2.228
							Mean	1.987	2.180	9.751	11.360	11.275	-0.744
							Std Dev	0.048	0.046	0.592	0.075	0.057	0.505
						+155 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	2.117	2.358	13.941	17.122	17.127	1.198
							Mimimum	1.892	2.115	9.616	16.448	16.216	-2.991
							Mean	1.981	2.226	12.347	16.823	16.797	-0.157
							Std Dev	0.047	0.051	0.776	0.128	0.145	0.722

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								Inductance (µH)			DC Resistance (mΩ)		
								Initial	Final	%Δ	Initial	Final	%Δ
	Low Temperature Storage	EC-60068 Part 2-1 test group Aa	-55°C for 2000 hours unpowered readings at 0, 250, 500, 1000 and 2000 hour intervals. Initial (0 hr.) and final (2000 hr.) readings at LT/RT/H	L=±20% of initial, DCR =±20% of initial	77	-55 deg. C	Maximum	2.131	2.193	2.888	8.075	7.995	0.340
							Mimimum	1.882	1.897	0.096	7.865	7.781	-2.403
							Mean	1.978	1.987	0.456	7.952	7.876	-0.957
							Std Dev	0.054	0.055	0.345	0.052	0.043	0.765
						+25 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	2.137	2.137	0.939	11.489	11.435	0.654
							Mimimum	1.890	1.902	-0.201	11.313	11.253	-1.114
							Mean	1.983	1.989	0.310	11.390	11.345	-0.399
							Std Dev	0.055	0.053	0.202	0.044	0.043	0.336
						+155 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	2.137	2.139	0.311	17.107	17.107	1.149
							Mimimum	1.890	1.895	-0.107	16.676	16.515	-2.210
							Mean	1.979	1.981	0.119	16.888	16.883	-0.023
							Std Dev	0.053	0.053	0.092	0.097	0.112	0.664

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								Inductance (µH)			DC Resistance (mΩ)		
								Initial	Final	%Δ	Initial	Final	%Δ
4	Temperature Cycling	IEC-60068, Part 2.14 test group Na	-55°C to +125°C (+155° C for -5A models) dw ell time = 30 min. transfer time ≤10 sec. no. of cycles = 1000 unpow ered initial (0 cycles) and final 1000 cycles). Readings at LT/RT/HT	L=±20% of initial, DCR =±20% of initial	77	-55 deg. C	Maximum	2.122	2.194	5.294	8.038	7.906	0.241
							Mimimum	1.876	1.963	2.606	7.782	7.675	-2.962
							Mean	1.977	2.056	3.994	7.877	7.814	-0.794
							Std Dev	0.056	0.053	0.510	0.049	0.046	0.760
						+25 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	2.126	2.198	5.378	11.650	11.316	-1.514
							Mimimum	1.881	1.966	3.210	11.361	11.107	-3.877
							Mean	1.981	2.063	4.119	11.537	11.219	-2.753
							Std Dev	0.056	0.054	0.494	0.059	0.048	0.498
						+155 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	2.120	2.230	6.905	17.058	16.992	1.166
							Mimimum	1.881	1.987	4.875	16.556	16.043	-3.443
							Mean	1.977	2.089	5.670	16.808	16.729	-0.465
							Std Dev	0.055	0.055	0.393	0.128	0.144	0.770

								Inductance (µH)			DC Resistance (mΩ)		
								Initial	Final	%Δ	Initial	Final	%Δ
7	Biased Humidity	IEC-60068 Part 2-67	Temperature = 85°C ±20°C Humidity = 85% ±5% RH Duration = 1000 hours Pow er = No Pow er Initial (0hr.) and final (1000hr.) readings at LT/RT/HT	L=±20% of initial, DCR =±20% of initial	77	-55 deg. C	Maximum	2.150	2.155	0.923	8.083	8.042	0.533
							Mimimum	1.868	1.869	-0.715	7.839	7.766	-2.511
							Mean	1.974	1.979	0.286	7.929	7.880	-0.618
							Std Dev	0.050	0.050	0.236	0.049	0.058	0.565
						+25 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	2.158	2.163	0.945	11.468	11.449	0.204
							Mimimum	1.870	1.870	-0.146	11.231	11.137	-1.350
							Mean	1.976	1.985	0.440	11.325	11.287	-0.336
							Std Dev	0.051	0.050	0.215	0.050	0.063	0.336
						+155 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	2.147	2.156	1.086	17.125	17.118	2.241
							Mimimum	1.852	1.857	-0.089	16.375	16.450	-2.453
							Mean	1.965	1.977	0.587	16.874	16.822	-0.302
							Std Dev	0.051	0.051	0.227	0.131	0.126	0.703

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								Inductance (µH)			DC Resistance (mΩ)		
								Initial	Final	%Δ	Initial	Final	%Δ
8	Operational Life	MIL-STD-202, Method 108A	Temperature = 85°C for -1A/A1 models. Temperature =115° C for -5A models. Duration = 2000hrs. Pow er = As noted on the test request. Readings a 0, 250, 500, 1000 and 2000 hour intervals. Initial (0 hr.) and final (2000 hr.) readings at LT/RT/HT	L=±20% of initial, DCR =±20% of initial	77	-55 deg. C	Maximum	2.121	2.240	13.518	8.403	9.451	12.472
							Mimimum	1.886	2.006	4.551	7.831	7.719	-4.444
							Mean	1.989	2.116	6.409	7.963	7.849	-1.438
							Std Dev	0.052	0.053	1.312	0.086	0.198	1.939
						+25 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	2.128	2.263	14.325	12.035	13.408	11.408
							Mimimum	1.890	2.023	5.393	11.247	11.170	-3.077
							Mean	1.994	2.138	7.211	11.414	11.312	-0.896
							Std Dev	0.053	0.054	1.338	0.114	0.250	1.547
						+155 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	2.126	2.301	16.233	18.011	20.280	12.598
							Mimimum	1.892	2.040	6.714	16.629	16.520	-1.889
							Mean	1.993	2.162	8.469	16.959	16.896	-0.380
							Std Dev	0.053	0.058	1.466	0.183	0.410	1.676

9	External Visual	MIL-STD-883G Method 2009.9	Inspect construction and workmanship.	Pass all criteria as defined in DPS-11,865 VA1	All	na	Pass
10	Physical Dimensions	JESD22 Method JB-100	Verify physical dimensions per part specification	All parts within dimensional tolerance per data sheet	30	na	Pass
12	Resistance to Solvents	MIL-STD-202G Method 215K	Add Aqueous wash chemical. OKEM Clean or equivalent. Do not use banned solvents.	Pass all criteria as defined in DPS-11,865 VA1 L=±20% of initial, DCR =±20% of initial	5	na	Pass

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								Inductance (µH)			DC Resistance (mΩ)		
								Initial	Final	%Δ	Initial	Final	%Δ
13	Mechanical Shock	IEC-60068 part 2.27 test group Ea with precondition per 0 above	Pulse Shape-Half Sine Normal Pulse Length 6ms Peak acceleration-100g No. shocks-6 each in both directions of each axis (total of 36) Initial and final readings at LT/RT/HT	L=±20% of initial, DCR =±20% of initial	30	-55 deg. C	Maximum	2.042	2.049	0.819	8.025	8.010	0.434
							Mimimum	1.866	1.878	0.331	7.790	7.797	-0.187
							Mean	1.957	1.967	0.534	7.864	7.873	0.117
							Std Dev	0.045	0.044	0.120	0.055	0.052	0.118
						+25 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	2.049	2.059	0.883	11.439	11.423	0.124
							Mimimum	1.870	1.883	0.332	11.238	11.234	-0.644
							Mean	1.962	1.973	0.582	11.336	11.324	-0.105
							Std Dev	0.045	0.045	0.127	0.053	0.049	0.146
						+155 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	2.042	2.046	0.299	17.037	17.056	0.557
							Mimimum	1.863	1.865	0.108	16.676	16.613	-0.494
							Mean	1.955	1.959	0.215	16.841	16.854	0.080
							Std Dev	0.045	0.045	0.048	0.085	0.093	0.237
								Inductance (µH)			DC Resistance (mΩ)		
								Initial	Final	%Δ	Initial	Final	%Δ
14	Vibration	IEC-60068 PART 2-6 TEST GROUP Fc. With precondition per 0 above	Pulse Shape-sine wave range of frequency 1 10-55Hz. Amplitude ±0.75mm Range of frequency 2 55-2000Hz Amplitude; 10G Frequency Sweep: 1 oct./min. Duration: 24 h each of 3 axis. Initial and final readings at LT/RT/HT	L=±20% of initial, DCR =±20% of initial	30	-55 deg. C	Maximum	2.076	2.082	0.744	7.997	7.994	0.302
							Mimimum	1.872	1.880	0.026	7.798	7.783	-0.927
							Mean	1.938	1.945	0.397	7.885	7.863	-0.283
							Std Dev	0.050	0.049	0.165	0.047	0.058	0.254
						+25 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	2.082	2.090	0.764	11.432	11.404	-0.088
							Mimimum	1.876	1.887	0.172	11.253	11.207	-0.980
							Mean	1.942	1.952	0.510	11.340	11.296	-0.388
							Std Dev	0.050	0.049	0.140	0.051	0.055	0.221
						+155 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	2.073	2.076	0.800	17.073	16.964	-0.335
							Mimimum	1.874	1.877	-0.005	16.841	16.251	-3.846
							Mean	1.934	1.939	0.264	16.940	16.695	-1.447
							Std Dev	0.049	0.048	0.225	0.069	0.162	0.842

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								Inductance (µH)			DC Resistance (mΩ)		
								Initial	Final	%Δ	Initial	Final	%Δ
	Bump	IEC-60068 part 2-29 test group Eb with precondition per 0 above.	Pulse shape: half sine Nominal pulse length: 6 ms Peak Acceleration: 40g No. of shocks: 4000 each mechanical axis. Initial and final readings at LT/RT/HT	L=±20% of initial, DCR =±20% of initial	30	-55 deg. C	Maximum	2.075	2.088	0.954	8.036	7.994	-0.153
							Mimimum	1.839	1.857	0.374	7.795	7.775	-0.626
							Mean	1.961	1.973	0.623	7.905	7.879	-0.332
							Std Dev	0.053	0.052	0.139	0.064	0.055	0.150
						+25 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	2.084	2.094	0.758	11.445	11.445	0.439
							Mimimum	1.849	1.863	0.315	11.212	11.214	-0.527
							Mean	1.968	1.979	0.528	11.338	11.336	-0.018
							Std Dev	0.053	0.053	0.122	0.051	0.053	0.132
						+155 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	2.077	2.082	0.283	17.024	17.003	0.143
							Mimimum	1.851	1.853	0.003	16.707	16.683	-0.570
							Mean	1.960	1.964	0.172	16.871	16.852	-0.112
							Std Dev	0.054	0.054	0.073	0.085	0.081	0.129
								Inductance (µH)			DC Resistance (mΩ)		
								Initial	Final	%Δ	Initial	Final	%Δ
15	Resistance to Solder Heat	MIL-STD-202G Method 210F Condition K	IR/convection reflow. 250 ± 5°C for 30 ± 5sec. Ramp rate 1°C/s to 4°C/; Above 183°C for 90s-120s	L=±20% of initial, DCR =±20% of initial	30	+25 deg. C	Maximum	2.048	2.073	3.492	11.574	11.566	-0.061
							Mimimum	1.776	1.838	0.871	11.418	11.395	-0.444
							Mean	1.884	1.926	2.228	11.487	11.462	-0.214
							Std Dev	0.056	0.050	0.776	0.042	0.044	0.099
								Inductance (µH)			DC Resistance (mΩ)		
								Initial	25KV	%Δ	Initial	25KV	%Δ
17	ESD	AEC-Q200-002	Determine the Classification of the part.	L=±20% of initial, DCR =±20% of initial	15	+25 deg. C	Maximum	2.022	2.038	1.310	11.486	11.527	0.484
							Mimimum	1.791	1.805	0.375	11.342	11.363	0.114
							Mean	1.904	1.919	0.801	11.415	11.444	0.252
							Std Dev	0.060	0.060	0.235	0.044	0.048	0.100
18	Solderability	J-STD-002C Method B1	4 hours @ 155°C dry heat @ 255°C. 90° dipping angle.	95% or greater coverage on "A" (seating plane) per J-STD-002C	15	NA	Pass						

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								Inductance (µH)			DC Resistance (mΩ)		
19	Electrical Characterization	User Specification	Min, Max, Mean, and Standard Deviation @ Min (-55C), Room, and Max (+125C) operating temperatures. After mounted, allow +/-5% shift DCR at room temp. -55C/+125C DCR Max calculated using temp conversion for copper: $R_2 = [(T_2 + 234.5) / (234.5 + T_A)] * 1.05R_A$ (A = Ambient, 2 = new con)	Final Test: L=±20% of initial, DCR per calculated limits described in test conditions. L test for -55C & +125C = ±20% initial	30			Initial			Initial		
						-55 deg. C	Maximum	2.075			8.036		
							Mimimum	1.839			7.795		
							Mean	1.961			7.905		
							Std Dev	0.053			0.064		
						+25 deg. C		Initial			Initial		
							Maximum	2.084			11.445		
							Mimimum	1.849			11.212		
							Mean	1.968			11.338		
							Std Dev	0.053			0.051		
						+155 deg. C		Initial			Initial		
							Maximum	2.077			17.024		
							Mimimum	1.851			16.707		
							Mean	1.960			16.871		
							Std Dev	0.054			0.085		
21	Board Flex	AEC-Q200-005 Appendix 2	2mm minimum flex for 60 (+5) sec	Pass all criteria as defined in DPS-11,865 VA1 L=±20% of initial, DCR =±20% of initial	30			Inductance (µH)			DC Resistance (mΩ)		
								Initial	Final	%Δ	Initial	Final	%Δ
						+25 deg. C	Maximum	2.014	2.017	0.600	11.573	11.589	0.396
							Mimimum	1.761	1.765	0.041	11.369	11.394	-0.130
							Mean	1.882	1.888	0.315	11.455	11.471	0.138
							Std Dev	0.061	0.062	0.145	0.051	0.051	0.103
22	Terminal Strength	AEC-Q200-006 Appendix 1	Force of 1.8kg (17.7 N) for 60 seconds	Pass all criteria as defined in DPS-11,865 VA1 L=±20% of initial, DCR =±20% of initial	30			Inductance (µH)			DC Resistance (mΩ)		
								Initial	Final	%Δ	Initial	Final	%Δ
						+25 deg. C	Maximum	2.035	2.025	0.459	11.470	11.500	0.873
							Mimimum	1.800	1.792	-1.031	11.275	11.320	-0.053
							Mean	1.896	1.889	-0.379	11.390	11.414	0.211
							Std Dev	0.057	0.058	0.241	0.053	0.052	0.189

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Test #	Description	Ref. Spec. Meth / Cond	Test Conditions	End Point Δ requirements	Sample Size	Meas Temp							
0	3x reflow Preconditioning for lead-free products	ICP 10,373	As specified in sections 6.3 thru 6.4 except Visual per DPS-11,865 10X magnification										
1	Pre- and Post-Stress Electrical Test	IHLP Data Sheet	L (uH) – 100KHz and 250mV DCR – 25°C Ambient	L=±15% of initial, DCR =±15% of initial	All tests requiring electrical data								
3	High Temp Exposure	IEC-60068 Part 2-2 test group BA	155C for 2000 hours, unpowered readings at 0, 250, 500, 1000 and 2000 hour intervals. Initial (0 hr.) and final (2000 hr.) readings at LT/RT/HT LT=Low Temperature=-55°C, RT=Room Temperature=+25°C,HT=High Temperature=+125°C for –A1/1A models. HT=High Temperature =+155° C for -5A models.	L=±20% of initial, DCR =±20% of initial	77			Inductance (µH)			DC Resistance (mΩ)		
								Initial	Final	%Δ	Initial	Final	%Δ
						-55 deg. C	Maximum	33.058	34.853	5.684	100.710	100.890	1.513
							Mimimum	30.083	31.660	4.901	97.100	96.120	-1.690
							Mean	31.610	33.284	5.296	98.892	98.592	-0.302
							Std Dev	0.742	0.793	0.169	0.782	1.044	0.869
						+25 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	33.109	35.081	6.245	146.700	145.050	-0.304
							Mimimum	30.115	31.872	4.6966	144.120	143.340	-1.125
							Mean	31.616	33.484	5.907	145.101	144.065	-0.714
							Std Dev	0.759	0.807	1.448	0.423	0.400	0.183
						+155 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	33.099	36.071	9.371	222.880	221.770	0.415
							Mimimum	29.977	32.601	8.418	218.530	217.020	-1.408
							Mean	31.482	34.291	8.922	220.350	219.223	-0.511
							Std Dev	0.791	0.881	0.229	1.044	1.124	0.409

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								Inductance (µH)			DC Resistance (mΩ)		
								Initial	Final	%Δ	Initial	Final	%Δ
	Low Temperature Storage	EC-60068 Part 2-1 test group Aa	-55°C for 2000 hours unpowered readings at 0, 250, 500, 1000 and 2000 hour intervals. Initial (0 hr.) and final (2000 hr.) readings at LT/RT/H	L=±20% of initial, DCR =±20% of initial	77	-55 deg. C	Maximum	32.927	32.906	0.042	100.380	100.230	1.429
							Mimimum	30.218	30.180	-0.260	97.110	96.370	-1.848
							Mean	31.428	31.395	-0.102	98.820	98.388	-0.434
							Std Dev	0.702	0.703	0.102	0.774	0.876	0.876
						+25 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	32.957	33.096	0.433	145.950	150.770	-0.063
							Mimimum	30.198	30.279	-0.056	144.280	141.230	4.094
							Mean	31.442	31.514	0.227	145.060	144.969	-2.364
							Std Dev	0.714	0.729	0.125	0.294	1.584	1.077
						+155 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	32.860	32.971	0.437	223.800	222.360	0.698
							Mimimum	29.999	30.106	0.036	218.630	218.340	-1.102
							Mean	31.300	31.369	0.223	220.226	220.180	-0.020
							Std Dev	1.107	0.756	0.126	1.107	1.114	0.482

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								Inductance (µH)			DC Resistance (mΩ)		
								Initial	Final	%Δ	Initial	Final	%Δ
4	Temperature Cycling	IEC-60068, Part 2.14 test group Na	-55°C to +125°C (+155° C for -5A models) dwell time = 30 min. transfer time ≤10 sec. no. of cycles = 1000 unpowered initial (0 cycles) and final 1000 cycles). Readings at LT/RT/HT	L=±20% of initial, DCR =±20% of initial	77	-55 deg. C	Maximum	32.575	32.959	1.680	99.920	105.240	6.727
							Mimimum	29.072	29.550	1.058	90.850	96.961	-0.241
							Mean	31.301	31.738	1.398	98.529	101.680	2.683
							Std Dev	0.662	0.656	0.124	1.083	1.788	1.760
						+25 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	32.703	33.143	1.897	146.220	152.150	4.909
							Mimimum	29.119	29.672	1.171	144.500	144.280	-0.205
							Mean	31.393	31.880	1.540	145.160	145.369	0.144
							Std Dev	0.672	0.668	0.131	0.336	1.061	0.718
						+155 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	32.582	33.569	3.872	223.300	217.030	-1.608
							Mimimum	28.844	29.889	2.985	218.350	206.960	-6.659
							Mean	31.147	32.181	3.323	220.309	211.727	-3.894
							Std Dev	1.074	0.710	0.180	1.074	2.533	1.149

								Inductance (µH)			DC Resistance (mΩ)		
								Initial	Final	%Δ	Initial	Final	%Δ
7	Biased Humidity	IEC-60068 Part 2-67	Temperature = 85°C ±20°C Humidity = 85% ±5% RH Duration = 1000 hours Power = No Power Initial (0hr.) and final (1000hr.) readings at LT/RT/HT	L=±20% of initial, DCR =±20% of initial	77	-55 deg. C	Maximum	32.478	32.396	0.340	99.940	99.910	0.592
							Mimimum	29.617	29.501	-0.778	96.750	96.800	-1.386
							Mean	31.325	31.238	-0.278	98.382	98.365	-0.017
							Std Dev	0.687	0.735	0.236	0.687	0.759	0.457
						+25 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	32.545	32.395	-0.093	146.190	146.320	0.566
							Mimimum	29.609	29.496	-0.958	144.340	144.600	-0.103
							Mean	31.389	31.243	-0.467	145.097	145.239	0.098
							Std Dev	0.744	0.749	0.157	0.347	0.360	0.135
						+155 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	32.373	32.190	0.094	223.520	223.910	0.560
							Mimimum	29.385	29.291	-0.702	218.630	219.050	-0.073
							Mean	31.151	31.051	-0.319	220.384	220.833	0.203
							Std Dev	0.774	0.754	0.178	1.117	1.192	0.162

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								Inductance (µH)			DC Resistance (mΩ)		
								Initial	Final	%Δ	Initial	Final	%Δ
8	Operational Life	MIL-STD-202, Method 108A	Temperature = 85°C for -1A/A1 models. Temperature =115° C for -5A models. Duration = 2000hrs. Power = As noted on the test request. Readings a 0, 250, 500, 1000 and 2000 hour intervals. Initial (0 hr.) and final (2000 hr.) readings at LT/RT/HT	L=±20% of initial, DCR =±20% of initial	77	-55 deg. C	Maximum	33.133	36.060	14.942	99.950	100.300	1.796
							Mimimum	29.685	32.102	2.241	98.270	97.650	-2.131
							Mean	31.298	34.134	9.081	99.075	98.728	-0.348
							Std Dev	0.674	0.808	2.542	0.375	0.586	0.729
								Initial	Final	%Δ	Initial	Final	%Δ
						+25 deg. C	Maximum	33.456	36.434	12.033	148.110	145.690	0.215
							Mimimum	29.742	32.374	5.983	144.230	143.440	-2.431
							Mean	31.422	34.392	9.459	145.385	144.479	-0.622
							Std Dev	0.738	0.824	1.100	0.499	0.412	0.323
								Initial	Final	%Δ	Initial	Final	%Δ
						+155 deg. C	Maximum	33.396	37.378	19.497	221.190	220.430	0.686
							Mimimum	29.632	32.954	4.563	218.450	217.650	-1.420
							Mean	31.285	35.159	12.413	219.715	218.870	-0.384
							Std Dev	0.735	0.889	2.913	0.685	0.681	0.405

9	External Visual	MIL-STD-883G Method 2009.9	Inspect construction and workmanship.	Pass all criteria as defined in DPS-11,865 VA1	All	na	Pass
10	Physical Dimensions	JESD22 Method JB-100	Verify physical dimensions per part specification	All parts within dimensional tolerance per data sheet	30	na	Pass
12	Resistance to Solvents	MIL-STD-202G Method 215K	Add Aqueous wash chemical. OKEM Clean or equivalent. Do not use banned solvents.	Pass all criteria as defined in DPS-11,865 VA1 L=±20% of initial, DCR =±20% of initial	5	na	Pass

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								Inductance (µH)			DC Resistance (mΩ)		
								Initial	Final	%Δ	Initial	Final	%Δ
13	Mechanical Shock	IEC-60068 part 2.27 test group Ea with precondition per 0 above	Pulse Shape-Half Sine Normal Pulse Length 6ms Peak acceleration-100g No. shocks-6 each in both directions of each axis (total of 36) Initial and final readings at LT/RT/HT	L=±20% of initial, DCR =±20% of initial	30	-55 deg. C	Maximum	32.710	32.633	-0.126	100.840	101.210	0.903
							Mimimum	30.052	30.006	-0.273	96.350	97.220	0.030
							Mean	31.282	31.217	-0.205	98.497	98.923	0.434
							Std Dev	0.755	0.747	0.035	1.308	1.239	0.209
						+25 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	32.732	32.799	0.266	145.510	145.750	0.150
							Mimimum	30.040	30.058	0.012	144.320	144.580	0.256
							Mean	31.265	31.316	0.162	144.962	145.179	0.028
							Std Dev	0.766	0.778	0.066	0.307	0.288	0.064
						+155 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	32.647	32.640	0.114	221.290	222.230	0.703
							Mimimum	29.789	29.808	-0.022	216.960	217.410	0.018
							Mean	31.079	31.093	0.045	219.057	220.054	0.455
							Std Dev	0.799	0.792	0.035	1.243	1.384	0.184

								Inductance (µH)			DC Resistance (mΩ)		
								Initial	Final	%Δ	Initial	Final	%Δ
14	Vibration	IEC-60068 PART 2-6 TEST GROUP Fc. With precondition per 0 above	Pulse Shape-sine wave range of frequency 1 10-55Hz. Amplitude ±0.75mm Range of frequency 2 55-2000Hz Amplitude; 10G Frequency Sweep: 1 oct./min. Duration: 24 h each of 3 axis. Initial and final readings at LT/RT/HT	L=±20% of initial, DCR =±20% of initial	30	-55 deg. C	Maximum	32.994	32.902	-0.177	101.700	101.550	0.800
							Mimimum	29.924	29.871	-0.297	96.230	96.940	-0.147
							Mean	31.391	31.316	-0.241	98.582	98.853	0.278
							Std Dev	0.697	0.691	0.030	1.576	1.378	0.265
						+25 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	33.059	33.143	0.281	145.870	146.240	0.559
							Mimimum	29.884	29.927	0.119	144.640	144.580	-0.089
							Mean	31.369	31.434	0.207	145.087	145.347	0.179
							Std Dev	0.311	0.716	0.041	0.311	0.380	0.201
						+155 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	33.011	33.001	0.127	222.030	221.910	0.266
							Mimimum	29.758	29.796	-0.028	216.930	217.390	-0.113
							Mean	31.186	31.201	0.049	219.585	219.662	0.036
							Std Dev	0.722	0.715	1.124	1.456	1.340	0.088

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								Inductance (µH)			DC Resistance (mΩ)		
								Initial	Final	%Δ	Initial	Final	%Δ
	Bump	IEC-60068 part 2-29 test group Eb with precondition per 0 above.	Pulse shape: half sine Nominal pulse length: 6 ms Peak Acceleration: 40g No. of shocks: 4000 each mechanical axis.Initial and final readings at LT/RT/HT	L=±20% of initial, DCR =±20% of initial	30	-55 deg. C	Maximum	32.657	32.646	0.158	105.830	100.630	-0.317
							Mimimum	30.401	30.392	-0.131	100.150	96.570	-8.731
							Mean	31.465	31.463	-0.006	102.340	98.422	-3.801
							Std Dev	0.616	0.614	0.073	1.399	1.265	2.330
						+25 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	32.806	32.747	-0.159	146.220	145.820	-0.055
							Mimimum	30.510	30.391	-0.411	144.880	144.120	-0.919
							Mean	31.589	31.506	-0.266	145.360	144.816	-0.374
							Std Dev	0.348	0.640	0.061	0.348	0.417	0.222
						+155 deg. C		Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	32.626	32.700	0.357	215.570	221.020	4.891
							Mimimum	30.169	30.239	0.152	209.170	216.190	1.336
							Mean	31.333	31.417	0.266	212.536	218.572	2.848
							Std Dev	0.666	0.667	0.051	1.965	1.184	1.077
15	Resistance to Solder Heat	MIL-STD-202G Method 210F Condition K	IR/convection reflow. 250 ± 5°C for 30 ± 5sec. Ramp rate 1°C/s to 4°C/; Above 183°C for 90s-120s	L=±20% of initial, DCR =±20% of initial	30			Inductance (µH)			DC Resistance (mΩ)		
								Initial	Final	%Δ	Initial	Final	%Δ
						+25 deg. C	Maximum	32.248	32.360	0.460	145.790	145.920	0.289
							Mimimum	30.022	30.083	-0.064	144.280	144.460	-0.124
							Mean	31.318	31.351	0.107	145.105	145.156	0.035
							Std Dev	0.718	0.699	0.128	0.402	0.441	0.113
17	ESD	AEC-Q200-002	Determine the Classification of the part.	L=±20% of initial, DCR =±20% of initial	15			Inductance (µH)			DC Resistance (mΩ)		
								Initial	25KV	%Δ	Initial	25KV	%Δ
						+25 deg. C	Maximum	32.467	32.937	1.922	146.160	145.160	-0.408
							Mimimum	29.575	30.088	1.335	144.460	142.970	-1.031
							Mean	31.090	31.595	1.623	145.120	143.972	-791.000
							Std Dev	0.667	0.686	0.132	0.397	0.415	0.135
18	Solderability	J-STD-002C Method B1	4 hours @ 155°C dry heat @ 255°C. 90° dipping angle.	95% or greater coverage on "A" (seating plane) per J-STD-002C	15	NA	Pass						

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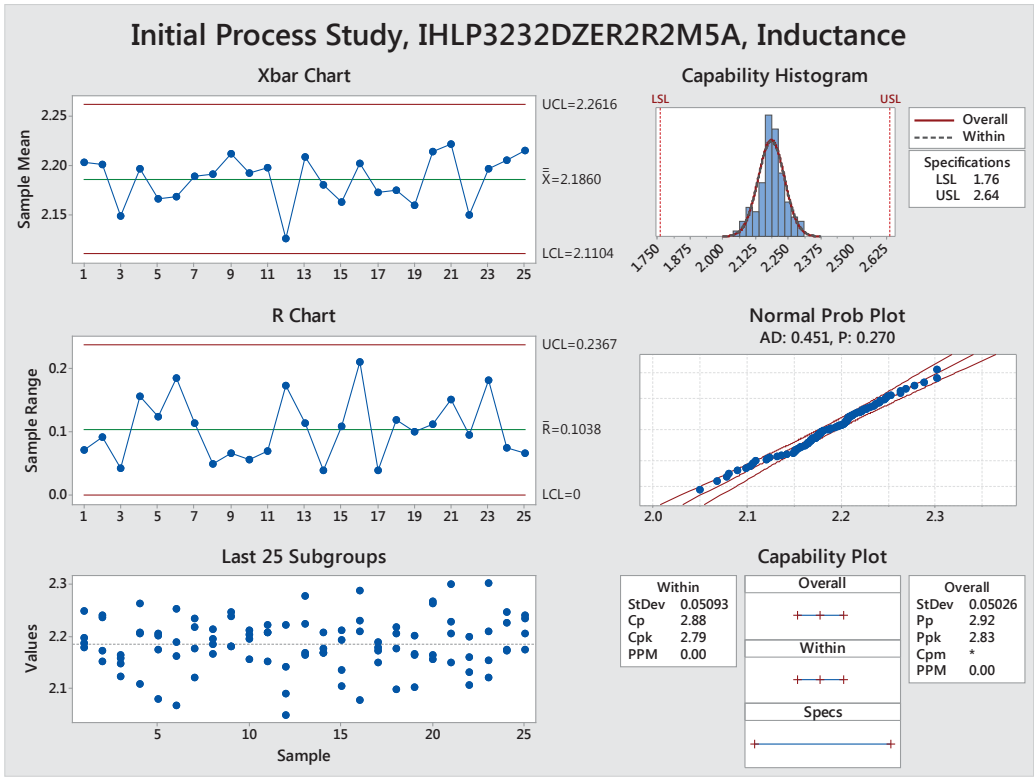
								Inductance (µH)			DC Resistance (mΩ)		
19	Electrical Characterization	User Specification	Min, Max, Mean, and Standard Deviation @ Min (-55C), Room, and Max (+125C) operating temperatures. After mounted, allow +/-5% shift DCR at room temp. -55C/+125C DCR Max calculated using temp conversion for copper: $R_2 = [(T_2 + 234.5) / (234.5 + T_A)] * 1.05R_A$ (A = Ambient, 2 = new con)	Final Test: L=±20% of initial, DCR per calculated limits described in test conditions. L test for -55C & +125C = ±20% initial	30			Initial			Initial		
						-55 deg. C	Maximum	32.657			105.830		
							Mimimum	30.401			100.150		
							Mean	31.465			102.340		
							Std Dev	0.616			1.399		
								Initial			Initial		
						+25 deg. C	Maximum	32.806			146.220		
							Mimimum	30.510			144.880		
							Mean	31.589			145.360		
							Std Dev	0.348			0.348		
								Initial			Initial		
						+155 deg. C	Maximum	32.626			215.570		
							Mimimum	30.169			209.170		
							Mean	31.333			212.536		
							Std Dev	0.666			1.965		
								Inductance (µH)			DC Resistance (mΩ)		
								Initial	Final	%Δ	Initial	Final	%Δ
21	Board Flex	AEC-Q200-005 Appendix 2	2mm minimum flex for 60 (+5) sec	Pass all criteria as defined in DPS-11,865 VA1 L=±20% of initial, DCR =±20% of initial	30	+25 deg. C	Maximum	32.467	32.730	1.349	147.180	144.560	-0.139
							Mimimum	30.084	30.205	-2.409	143.600	143.120	-2.215
							Mean	31.462	31.624	0.517	144.241	143.625	-0.426
							Std Dev	0.639	0.628	0.643	0.639	0.311	0.348
								Inductance (µH)			DC Resistance (mΩ)		
								Initial	Final	%Δ	Initial	Final	%Δ
22	Terminal Strength	AEC-Q200-006 Appendix 1	Force of 1.8kg (17.7 N) for 60 seconds	Pass all criteria as defined in DPS-11,865 VA1 L=±20% of initial, DCR =±20% of initial	30	+25 deg. C	Maximum	33.047	32.780	-0.797	145.880	145.820	0.055
							Mimimum	29.427	29.167	-1.042	144.580	144.440	-0.214
							Mean	31.520	31.239	-0.893	145.135	145.014	-0.083
							Std Dev	0.746	0.737	0.055	0.301	0.321	0.069

Production Part Approval Process

The following PPAP documentation is assembled according to AIAG, 4th Edition PPAP Manual and applicable customer requirements

Initial Process Study
IHLP3232DZER2R2M5A, Inductance

Inductance (uH)							
1	2.249	26	2.219	51	2.169	76	2.168
2	2.179	27	2.122	52	2.278	77	2.263
3	2.198	28	2.234	53	2.168	78	2.165
4	2.187	29	2.196	54	2.178	79	2.157
5	2.236	30	2.167	55	2.207	80	2.269
6	2.152	31	2.215	56	2.168	81	2.228
7	2.173	32	2.186	57	2.194	82	2.302
8	2.242	33	2.240	58	2.213	83	2.151
9	2.123	34	2.247	59	2.137	84	2.206
10	2.149	35	2.181	60	2.105	85	2.107
11	2.165	36	2.181	61	2.078	86	2.131
12	2.158	37	2.195	62	2.231	87	2.161
13	2.109	38	2.156	63	2.288	88	2.200
14	2.209	39	2.212	64	2.211	89	2.302
15	2.205	40	2.204	65	2.173	90	2.153
16	2.264	41	2.152	66	2.151	91	2.121
17	2.202	42	2.208	67	2.189	92	2.210
18	2.175	43	2.207	68	2.178	93	2.226
19	2.205	44	2.222	69	2.206	94	2.173
20	2.081	45	2.050	70	2.098	95	2.246
21	2.189	46	2.090	71	2.217	96	2.175
22	2.068	47	2.222	72	2.177	97	2.242
23	2.253	48	2.141	73	2.103	98	2.205
24	2.163	49	2.164	74	2.202	99	2.235
25	2.178	50	2.224	75	2.165	100	2.175

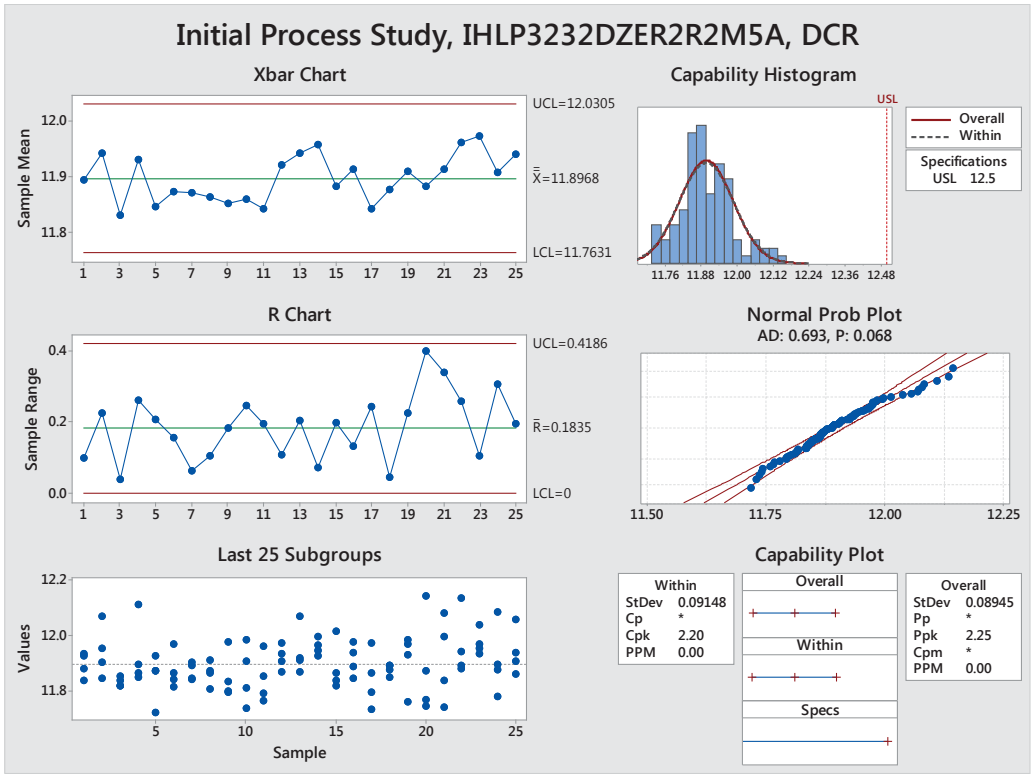


Production Part Approval Process

The following PPAP documentation is assembled according to AIAG, 4th Edition PPAP Manual and applicable customer requirements

Initial Process Study
IHLP3232DZER2R2M5A, DC Resistance

	DCR (mOhm)						
1	11.935	26	11.891	51	11.868	76	11.967
2	11.88	27	11.904	52	12.071	77	11.873
3	11.836	28	11.845	53	11.965	78	11.769
4	11.927	29	11.864	54	11.927	79	12.143
5	11.903	30	11.91	55	11.945	80	11.743
6	11.953	31	11.805	56	11.997	81	11.995
7	12.069	32	11.87	57	11.862	82	11.741
8	11.844	33	11.976	58	11.817	83	12.079
9	11.836	34	11.8	59	11.838	84	11.836
10	11.853	35	11.834	60	12.014	85	11.878
11	11.816	36	11.793	61	11.976	86	11.89
12	11.818	37	11.905	62	11.939	87	12.134
13	12.111	38	11.736	63	11.888	88	11.941
14	11.85	39	11.81	64	11.846	89	11.934
15	11.865	40	11.982	65	11.865	90	11.954
16	11.894	41	11.96	66	11.796	91	12.038
17	11.719	42	11.853	67	11.974	92	11.97
18	11.87	43	11.792	68	11.731	93	11.779
19	11.872	44	11.765	69	11.89	94	12.083
20	11.925	45	11.972	70	11.89	95	11.874
21	11.863	46	11.935	71	11.877	96	11.895
22	11.969	47	11.908	72	11.847	97	11.936
23	11.841	48	11.866	73	11.76	98	12.056
24	11.814	49	11.92	74	11.928	99	11.906
25	11.841	50	11.91	75	11.983	100	11.861

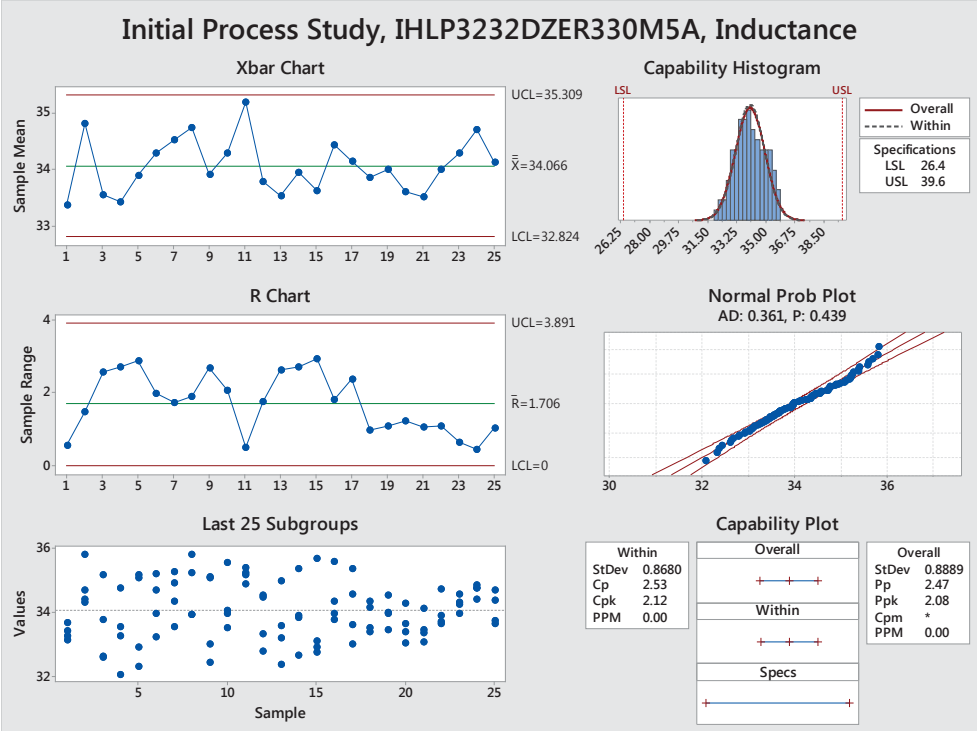


Production Part Approval Process

The following PPAP documentation is assembled according to AIAG, 4th Edition PPAP Manual and applicable customer requirements

Initial Process Study
IHLP3232DZER330M5A, Inductance

Inductance (uH)							
1	33.27	26	35.27	51	32.37	76	34.55
2	33.14	27	33.56	52	33.2	77	34.29
3	33.68	28	34.36	53	33.86	78	33.06
4	33.44	29	35.26	54	35.39	79	33.39
5	35.81	30	33.94	55	33.9	80	33.67
6	34.33	31	35.83	56	32.68	81	33.47
7	34.72	32	33.95	57	33.12	82	33.37
8	34.41	33	32.44	58	35.7	83	33.09
9	33.8	34	33.02	59	32.78	84	34.14
10	35.18	35	35.12	60	32.94	85	33.67
11	32.61	36	35.08	61	33.99	86	33.92
12	32.64	37	34.08	62	33.8	87	33.71
13	32.07	38	33.97	63	34.37	88	34.75
14	33.56	39	35.58	64	35.61	89	34.59
15	34.77	40	33.53	65	33.03	90	34.25
16	33.29	41	35.24	66	35.39	91	34.34
17	35.1	42	35.4	67	33.63	92	33.97
18	32.92	43	35.2	68	34.57	93	34.76
19	35.2	44	34.9	69	34.16	94	34.88
20	32.33	45	34.47	70	34.37	95	34.43
21	35.23	46	32.81	71	33.4	96	34.76
22	33.96	47	33.34	72	33.52	97	33.75
23	34.72	48	34.55	73	34	98	34.7
24	33.25	49	34.98	74	33.97	99	34.4
25	34.94	50	33.6	75	33.46	100	33.67

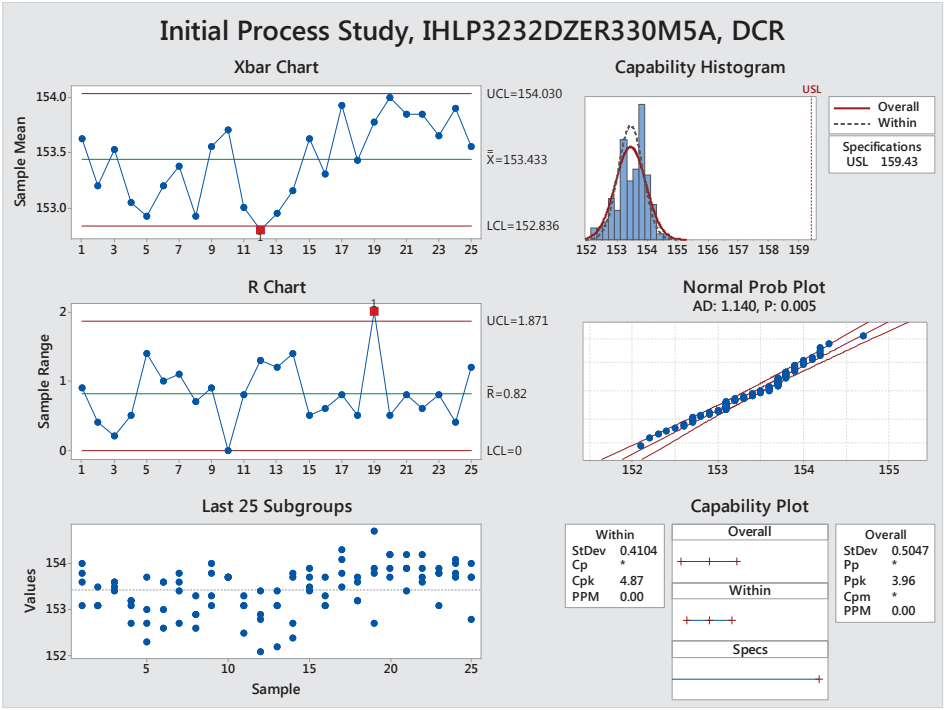


Production Part Approval Process

The following PPAP documentation is assembled according to AIAG, 4th Edition PPAP Manual and applicable customer requirements

Initial Process Study
IHLP3232DZER330M5A, DC Resistance

DCR (mOhm)							
1	154	26	153.8	51	153.4	76	153.8
2	153.1	27	153.6	52	153.1	77	154.2
3	153.6	28	152.7	53	152.7	78	153.7
4	153.8	29	153.3	54	153.7	79	154.2
5	153.1	30	152.6	55	153.8	80	153.9
6	153.1	31	152.9	56	152.4	81	153.9
7	153.1	32	152.9	57	153.9	82	154.2
8	153.5	33	153.8	58	153.5	83	153.4
9	153.4	34	153.1	59	153.7	84	153.9
10	153.6	35	153.3	60	153.4	85	154.2
11	153.5	36	154	61	153.3	86	153.6
12	153.6	37	153.7	62	153.1	87	153.7
13	153.2	38	153.7	63	153.1	88	153.9
14	152.7	39	153.7	64	153.7	89	153.1
15	153.2	40	153.7	65	154.1	90	153.8
16	153.1	41	153.1	66	154.3	91	153.8
17	152.3	42	153.1	67	153.8	92	153.9
18	153.7	43	152.5	68	153.5	93	154
19	152.7	44	153.3	69	153.2	94	153.8
20	153	45	152.9	70	153.6	95	153.7
21	153.6	46	153.4	71	153.2	96	154.1
22	153.6	47	152.1	72	153.7	97	153.7
23	152.6	48	152.8	73	152.7	98	154
24	153	49	153.1	74	153.9	99	152.8
25	153.4	50	152.2	75	154.7	100	153.7



Production Part Approval Process

The following PPAP documentation is assembled according to AIAG, 4th Edition PPAP Manual and applicable customer requirements

Use the control buttons below to navigate through the PPAP sections.

Section 12: Qualified Laboratories

Vishay / Dale Electronics
1505 East Hway 50 Yankton, SD 57078, USA Phone (605) 665-9301 Fax (605) 668-4247
ONE OF THE WORLD'S LARGEST MANUFACTURERS OF DISCRETE SEMICONDUCTORS AND PASSIVE COMPONENTS

Production Part Approval Process

The following PPAP documentation is assembled according to AIAG, 4th Edition PPAP Manual and applicable customer requirements

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Section 13: Appearance Approval Report

Inductors, like many other electronic components are specified for their electrical properties. There are no specific requirements stated for the physical appearance of inductors, e.g. color of inductors. Therefore, the Appearance Approval Report does not apply in this case.

Production Part Approval Process

The following PPAP documentation is assembled according to AIAG, 4th Edition PPAP Manual and applicable customer requirements

Use the control buttons below to navigate through the PPAP sections.

Section 14: Sample Product

Sample product from the Vishay Manufacturing Facility is available upon request

Production Part Approval Process

The following PPAP documentation is assembled according to AIAG, 4th Edition PPAP Manual and applicable customer requirements

Use the control buttons below to navigate through the PPAP sections.

Section 15: Master Sample

Master Sample(s) will be retained at the Vishay Manufacturing Facility with a copy of the PPAP

Production Part Approval Process

The following PPAP documentation is assembled according to AIAG, 4th Edition PPAP Manual and applicable customer requirements

Use the control buttons below to navigate through the PPAP sections.

Section 16: Checking Aids

Checking Aids are not required for this electronic component

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Production Part Approval Process

The following PPAP documentation is assembled according to AIAG, 4th Edition PPAP Manual and applicable customer requirements

Use the control buttons below to navigate through the PPAP sections.

Section 17: Records of Compliance

Moisture Sensitivity Level: 1

Production Part Approval Process

The following PPAP documentation is assembled according to AIAG, 4th Edition PPAP Manual and applicable customer requirements

Use the control buttons below to navigate through the PPAP sections.

Section 19: Bulk Material Requirements

Bulk Material Requirements do not apply to this Electronic Component.

IHLP Standards of Manufacture

IHLP INTRODUCTION SURFACE IRREGULARITIES CRITERIA FOR REJECTION SUMMARY

INTRODUCTION

Scope

This document was written for the purpose of helping customers better understand the product they are purchasing. It will give the customer an idea as to the type of cosmetic irregularities that may occur from time to time during the manufacture of the component itself or during customer use of the component.

This document also discusses the criteria that have been developed for rejection of irregularities that are determined to be excessive.

While it would be desirable to have cosmetically perfect IHLP inductors, the powdered iron manufacturing technique has cosmetic limitations.

Certified test labs have performed extensive environmental testing on IHLP's with and without cosmetic imperfections according to AEC-Q200 standards for such tests as thermal shock, mechanical shock, vibration, humidity and others. This testing has shown that the cosmetic imperfections listed in this document do not affect the performance or reliability of the IHLP inductor. Test results are available upon request.

Product

The IHLP inductor is unique from most inductors. The inductor body is a soft magnetic composite (SMC), not a ferrite. It is made from an iron powder mixture and cemented together using a resin binder. This powder mixture, when pressed around the inductor coil, greatly enhances the electrical properties of the inductor and gives protection from environmental forces. After pressing, the component is cured in an oven to increase the bonding strength of the resin binders with the iron powder, yielding excellent electrical and physical properties.

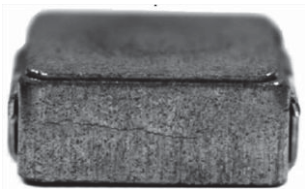
The IHLP inductor provides the best combination of:

- Inductance
- Low Core Loss
- Saturation
- Temperature Stability
- Smallest Footprint
- Lowest Profile

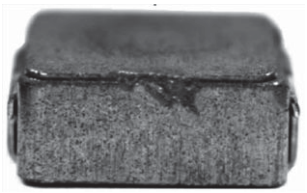
Surface irregularities

The following pages include descriptions of the most common irregularities seen on IHLP inductors. Common causes are described along with variations in their magnitude. Customers may at some time see one or all of these irregularities.

Those that are determined to adversely affect the customer's use of the component are rejected, but minor (acceptable) irregularities will occasionally be present. With the use of this guide, a customer will better understand the effect of each irregularity.



Cracks



Chips

Oxidation

APPLICATION NOTE

IHLP Standards of Manufacture

CRACKS

Cracks within the inductor body are unavoidable during the manufacturing process. Small cracks are caused by die wall friction when the parts are ejected during the pressing process and by expansion of the coil during the process of curing the resin binder in the powdered iron body. Unlike ferrite material, cracks on the IHLP body do not affect the electrical performance of the component.

Reliability testing has shown that even cracks in excess of 0.005" will not cause the component to fail electrically or physically in field application. Acceptance widths are adopted based on the ability to detect cracks both at the component and circuit level.

Terminal area crack, acceptable

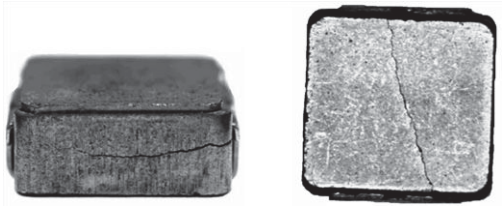
Cracks coming from the top corner of the terminal are a normal occurrence and are caused by terminal expansion during curing operations.

Negligible crack, acceptable

Negligible cracks are those that are nearly invisible without magnification.

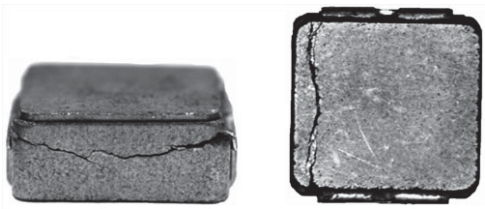
Minor crack, acceptable

Minor cracks are those that are visible without magnification but are not apparent without close inspection.



Moderate crack, rejectable

Moderate cracks are those that are obvious upon examination and continue across most of the component.



Major crack, rejectable

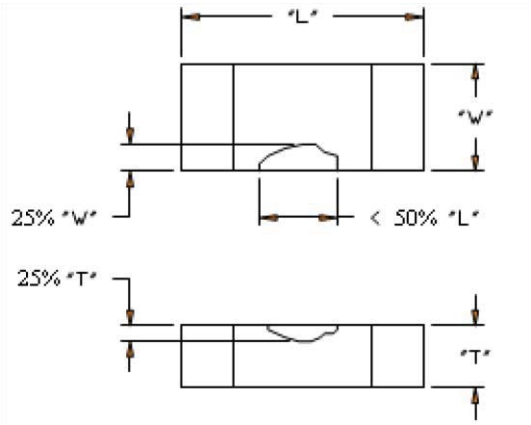
Major cracks are those that are obvious to a customer and would possibly result in large chip-outs that would expose the coil and lead frame.

APPLICATION NOTE

IHLP Standards of Manufacture

CHIPS

Chipping of the inductor body can occur during normal processing and testing of the inductor. The acceptance criteria for chipping vary with the size of the component, but current acceptance standards are based on IPCA-610. The effect of chipping is negligible as long as the inductor coil is not showing. See IPC standard for class 1 and 2 components below.



T	25 % of the thickness
W	25 % of the width
L	50 % of the length

Chips typically occur on the edges and corners of the inductor body. They are slightly darker in color and rougher in appearance than the surrounding material.

Minor chipping, acceptable

Minor chips in the inductor body are those that are typically shallow imperfections that occur on the corners and edge of components. No coil wire or lead frame is showing and the chip does not affect the performance or reliability of the component.

Major chipping, rejectable

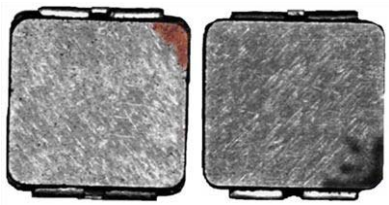
Major chips in the inductor body are those that are very obvious to the customer and may expose the wire coil or lead frame.

OXIDATION

The IHLP inductor is predominately iron and oxidation may occur in a small percentage of the inductors. Resin binders give moderate protection, but some slight oxidation may occur. All components should be stored away from heat, humidity and ionized atmospheres as much as possible before mounting.

Basic steps should be taken in order to limit surface oxidation, including keeping the IHLP inductors sealed in their packaging until PCB mounting.

In the case that oxidation does occur, the effects are contained to the surface of the component and do not penetrate into the core material. No electrical effects have ever been documented due to oxidation of the IHLP product. Oxidation should never be considered a reliability risk.



Top view

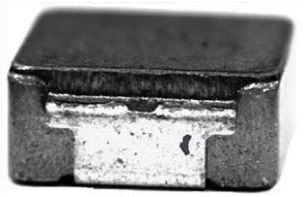
Side view

IHLP Standards of Manufacture

OTHER

A very small number of other irregularities have been reported. These occur at an exceedingly low rate and typically do not affect the components electrically. These include:

Foreign material may be seen pressed into the upper terminals. This material is of the same material as the inductor body and should not be a reason for rejection unless solderability is affected.



Foreign material: Acceptable

Scratches may be seen on the surface of the inductor body. Scratches are an acceptable surface irregularity.

Scratch: Acceptable

SUMMARY

The IHLP inductor is comprised of an iron powder body compressed around a coil. Due to the fact that this iron powder body is not solid like ferrite material, irregularities such as cracks and chips do not affect the electrical properties, or the reliability of the component. Criteria have been determined for the acceptability of the components that allow for a robust manufacturing process as well as an acceptable degree of cosmetic irregularity.

Reliability testing has been done on the effects of cracking of the iron powder body and on the oxidation of the iron particles that are present on the surface. Testing has shown no reliability issues from either of these cosmetic differences.

Instructions

ASSEMBLY INSTRUCTIONS

General

This document provides instructions on mounting for the different types of packages, specifically on the different methods of soldering.

If the device is to be mounted near heat-generating components, consideration must be given to the resultant increase in ambient temperature.

Soldering Instructions

Protection against overheating is essential when a device is being soldered. Therefore, the PCB traces should be left as long as possible. The maximum permissible soldering temperature is governed by the maximum permissible heat that may be applied to the package.

The maximum soldering iron (or solder bath) temperatures are given in the individual Datasheets. During soldering, no forces must be transmitted from the pins to the case (e.g., by spreading the pins).

Soldering Methods

There are several methods for soldering devices onto the substrate. The following list is not complete.

a. Soldering in the Vapor Phase
   Soldering in saturated vapor is also known as condensation soldering. This soldering process is used as a batch system (dual vapor system) or as a continuous single vapor system. Both systems may also include a pre-heating of the assemblies to prevent high temperature shock and other undesired effects.

b. Infrared Soldering
   By using infrared (IR) reflow soldering, the heating is contact-free and the energy for heating the assembly is derived from direct infrared radiation and from convection.

   The heating rate in an IR furnace depends on the absorption coefficients of the material surfaces and on the ratio of component's mass to an As-irradiated surface.

   The temperature of parts in an IR furnace, with a mixture of radiation and convection, cannot be determined in advance. Temperature measurement may be performed by measuring the temperature of a certain component while it is being transported through the furnace.

   The temperatures of small components, soldered together with larger ones, may rise up to 280 °C.

   Influencing parameters on the internal temperature of the component are as follows:

   - Time and power
   - Mass of the component
   - Size of the component
   - Size of the printed circuit board
   - Absorption coefficient of the surfaces
   - Packing density
   - Wavelength spectrum of the radiation source
   - Ratio of radiated and convected energy

   As a general rule of thumb, maximum temperature should be reached within 360 s and time above solder liquids temperature should be reached in less than 180 s.

   Temperature/time profiles of the entire process and the influencing parameters are given. The IR reflow profile is shown in Figure 1.

c. Wave Soldering
   In wave soldering one or more continuously replenished waves of molten solder are generated, while the substrates to be soldered are moved in one direction across the crest of the wave. Maximum soldering temperature should not exceed 260 °C for 20 s.

d. Iron Soldering
   This process cannot be carried out in a controlled situation. It should therefore not be used in applications where reliability is important. There is no SMD classification for this process.

CLEANING INSTRUCTIONS

A no clean solder system is recommended for IHLP's.
If cleaning must be performed, an Isopropyl alcohol is recommended. If de-ionized Water Wash is used insure it is followed by a thorough warm air dry cycle to avoid oxidation.

Some cleaning solutions, especially those containing non-linear alcohol will attack the IHLP and should be avoided. It is recommended that any chemical cleaning solution be thoroughly rinsed with clean water. The IHLP should be tested for compatibility with any cleaning solution before production assembly.

TYPICAL REFLOW SOLDERING PROFILE

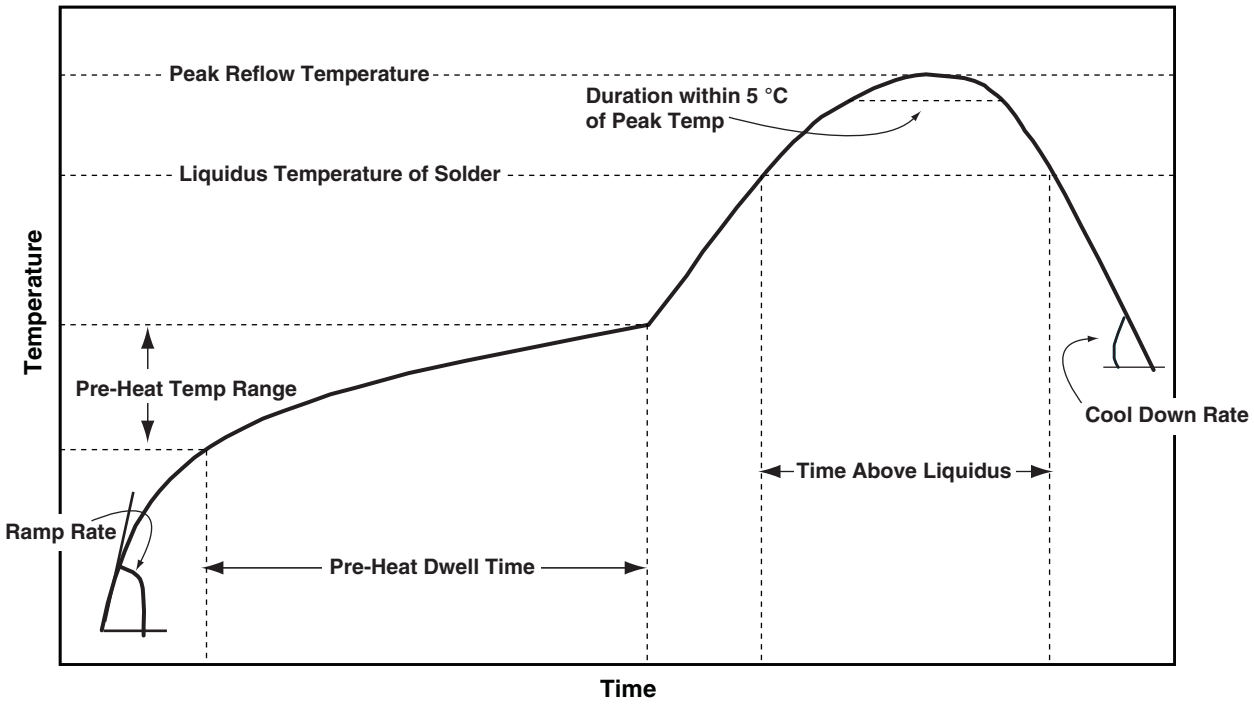


Fig. 1 - Infrared reflow soldering (SMD package)

LEAD (Pb)-FREE SOLDER (SnAgCu) REFLOW PROFILE ATTRIBUTES	
PROFILE ATTRIBUTE	**PROFILE ATTRIBUTE**
Peak Reflow Temperature	255 (± 5) °C
Time within 5 °C of Peak Temperature	30 s max.
Liquidus Temperature of Solder	~ 217 °C
Cool Down Rate	6 °C/s max.
Time above Liquidus	60 s to 150 s
Pre-heat Temperature Range	150 °C to 200 °C
Pre-heat Dwell Time	60 s to 120 s
Maximum Ramp Rate	3 °C/s max.