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

IHLD3232HBERxxxM5A

Generic PPAP

Manufacturing Site- Danshui, China

Date 6-Sept-2017

Production Part Approval Process

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TABLE OF CONTENTS

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

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TABLE OF CONTENTS

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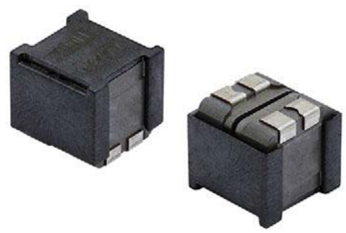
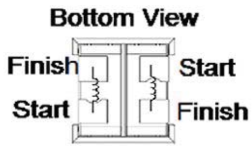
Use the control buttons below to navigate through the PPAP sections.

Section 1. Design Records

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

Low Profile, High Current Dual Inductors





DESIGN SUPPORT TOOLS click logo to get started

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)
5	27.3	29.2	6.0	8.5	18.0
10	50.0	53.50	5.0	5.2	13.0
15	62.0	66.34	4.2	3.5	10.0
22	103.0	110.21	3.3	2.9	9.0
33	149.0	159.43	2.4	2.9	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) = 50 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 %

FEATURES
- Two inductors in one package
- High temperature, up to 155 °C
- Shielded construction
- Optimal design realizes high quality sound and low distortion
- Low coupling for minimal cross-talk between inductors
- Frequency range up to 1 MHz
- Lowest DCR/µH, in this package size
- Handles high transient current spikes without saturation
- Ultra-low buzz noise, due to composite construction
- AEC-Q200 qualified
- IHLP design. PATENT(S): www.vishay.com/patents
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

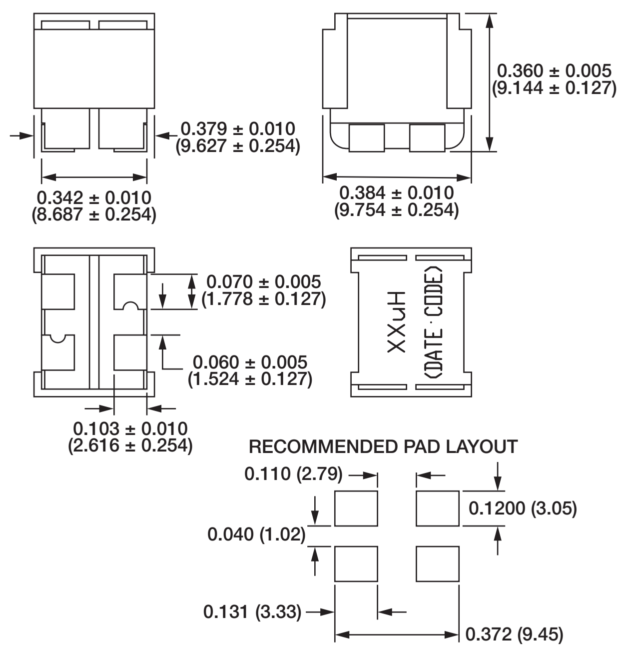
AUTOMOTIVE GRADE

Pb-free

RoHS COMPLIANT

APPLICATIONS
- Class D audio amplifiers

DIMENSIONS in inches [millimeters]



DESCRIPTION

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

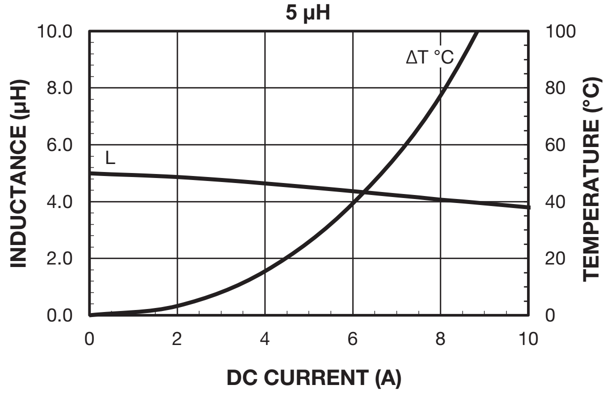
GLOBAL PART NUMBER

I	H	L	D	3	2	3	2	H	B	E	R	1	0	0	M	5	A
PRODUCT FAMILY				SIZE						PACKAGE CODE		INDUCTANCE VALUE			TOL.	SERIES	

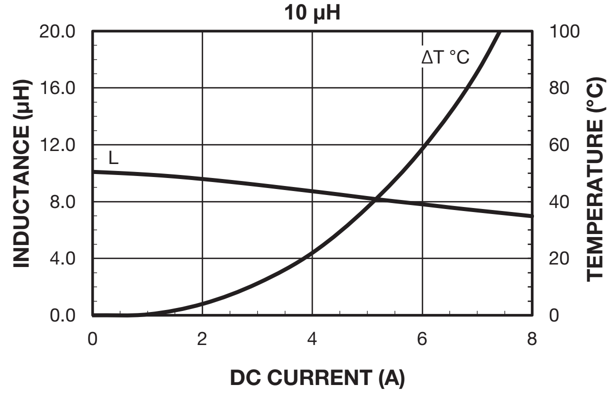
PATENT(S): www.vishay.com/patents
This Vishay product is protected by one or more United States and international patents.

PERFORMANCE GRAPHS

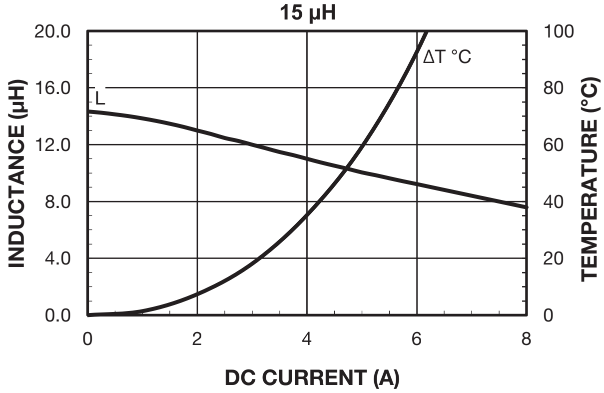
5 µH



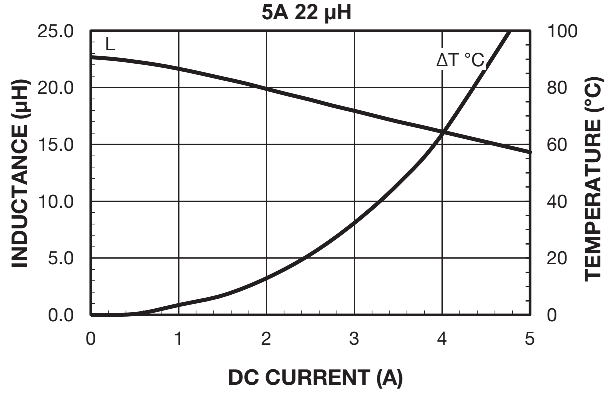
10 µH



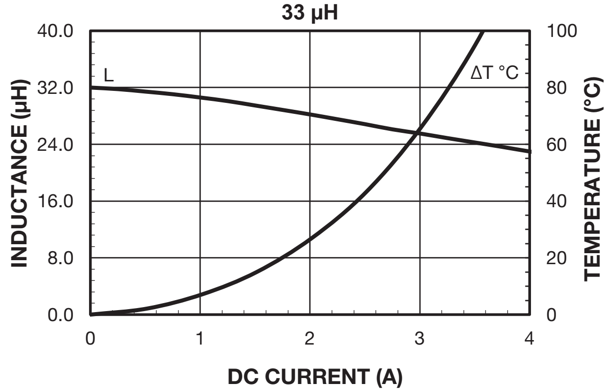
15 µH



5A 22 µH

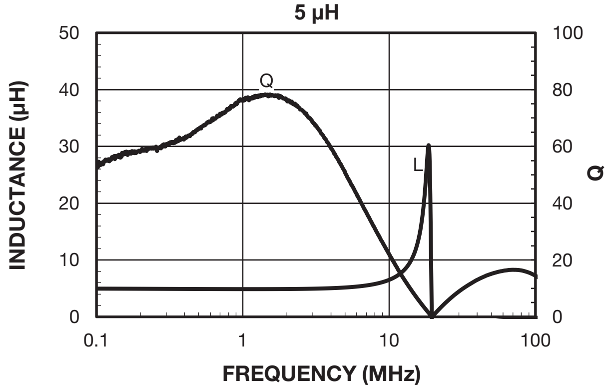


33 µH

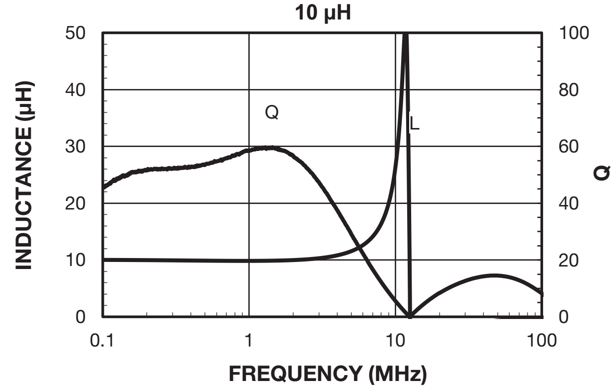


PERFORMANCE GRAPHS: INDUCTANCE AND Q VS. FREQUENCY

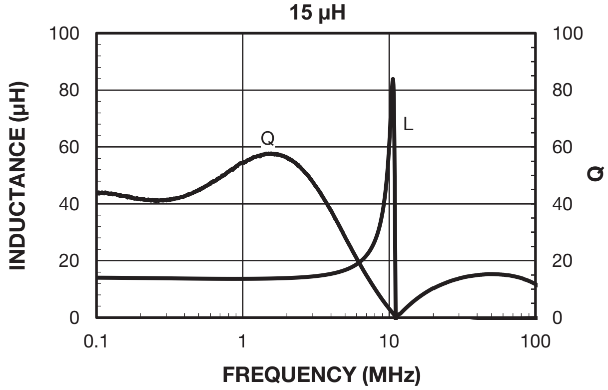
5 µH



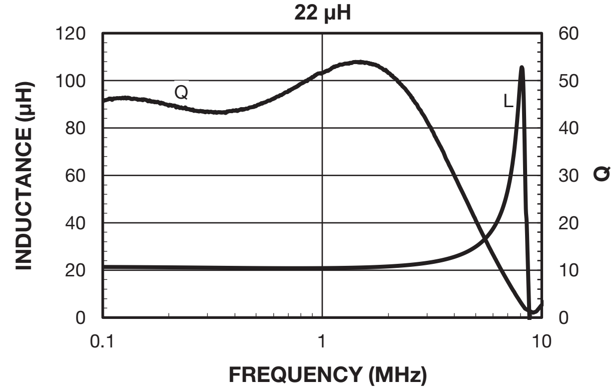
10 µH



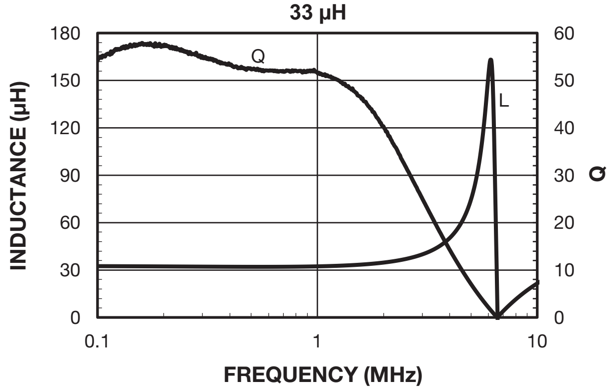
15 µH



22 µH



33 µH



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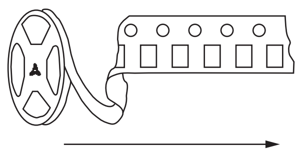
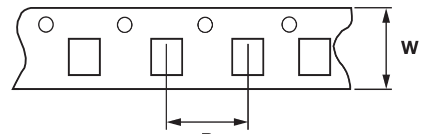
SMD Magnetics Packaging Methods

TAPE AND REEL in inches [millimeters] - Meets EIA RS-481 tape and reel packaging standard



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-1212ABER	-	-	ER	13	0.472 [12.0]	0.315 [8.0]	3000	-	-	-	-
IHLP-1212ABEV	-	-	ER	13	0.472 [12.0]	0.315 [8.0]	4000	-	-	-	-
IHLP-1212AEER	-	-	ER	13	0.472 [12.0]	0.315 [8.0]	3000	-	-	-	-
IHLP-1212BZER	-	-	ER	13	0.472 [12.0]	0.315 [8.0]	3000	-	-	-	-
IHLP-1212BZEV	-	-	ER	13	0.472 [12.0]	0.315 [8.0]	4000	-	-	-	-
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
IHLD-4032KB	-	-	ER	13	0.945 [24.0]	0.630 [16.0]	250	-	-	EB	100
IHLD-3232HB	-	-	ER	13	0.945 [24.0]	0.630 [16.0]	250	-	-	EB	100
IHLE-2525CD	-	-	ER	13	0.630 [16.0]	0.315 [8.0]	2000	-	-	EB	100
IHLE-3232DD	-	-	ER	13	0.630 [16.0]	0.472 [12.0]	500	-	-	EB	100
IHLE-4040DD	-	-	ER	13	0.945 [24.0]	0.630 [16.0]	500	-	-	EB	100
IHLR-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
IFLR-2727EZ	-	-	ER	13	0.630 [16.0]	0.630 [16.0]	1000	-	-	-	-
IFLR-4027EZ	-	-	ER	13	0.945 [24.0]	0.630 [16.0]	1000	-	-	-	-
IFLR-4031GC	-	-	ER	13	0.945 [24.0]	0.472 [12.0]	500	-	-	EB	100
IFLR-5151HZ	-	-	ER	13	0.945 [24.0]	0.630 [16.0]	450	-	-	EB	100

TAPE AND REEL in inches [millimeters] - Meets EIA RS-481 tape and reel packaging standard

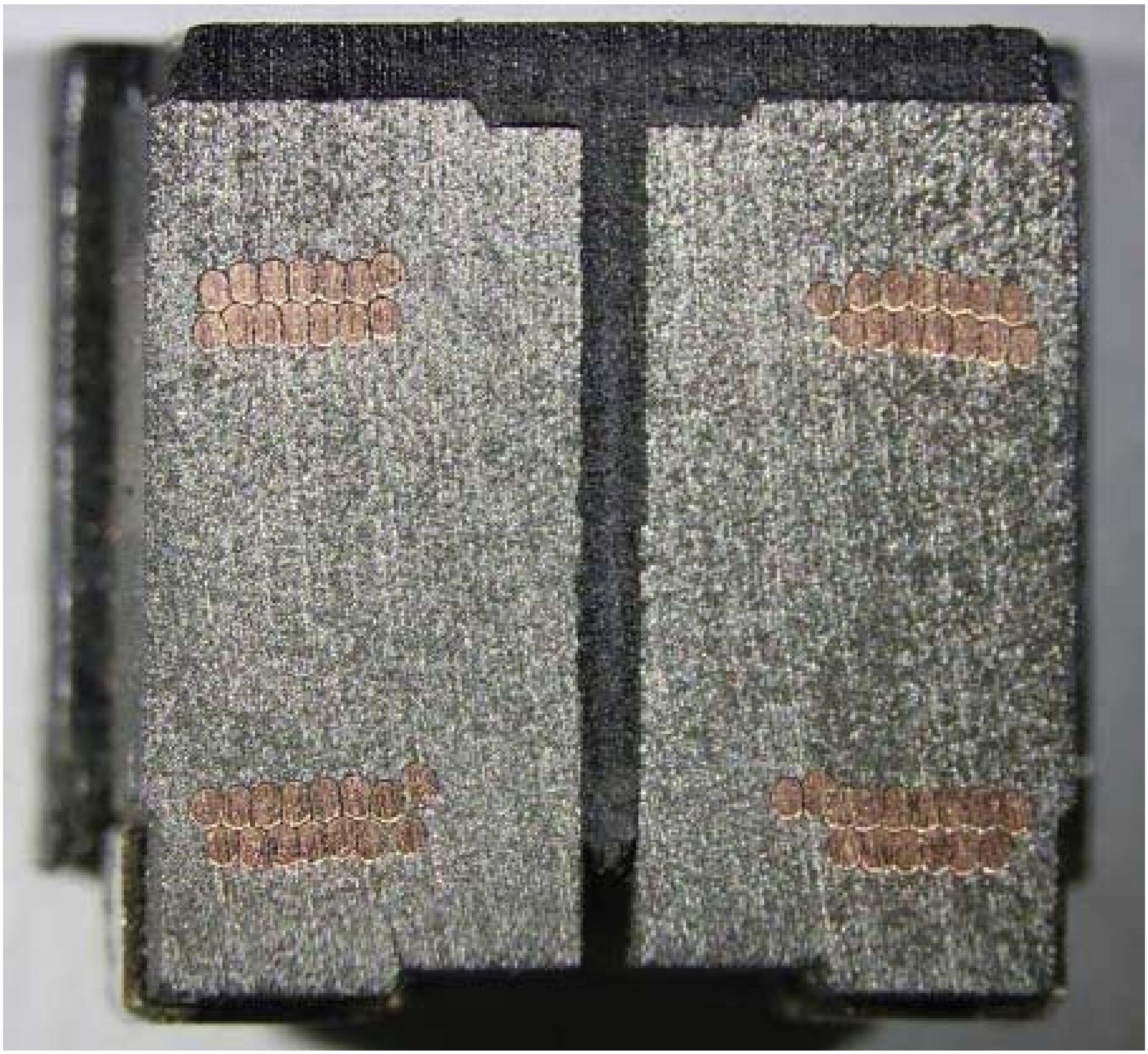
MODEL	PACKAGE CODE			REEL SIZE	CARRIER TAPE WIDTH (W)	COMPONENT PITCH (P)	UNITS/ REEL	PACKAGE CODE			UNITS/ BULK
	PREVIOUS CODE	GLOBAL CODE LEAD (Pb)-BEARING	GLOBAL CODE LEAD (Pb)-FREE					PREVIOUS CODE	GLOBAL CODE LEAD (Pb)-BEARING	GLOBAL CODE LEAD (Pb)-FREE	
IFSC-0806AZ	-	-	ER	7	0.315 [8.0]	0.157 [4.0]	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	-	-	-	-
IHHP-0806AZ-01	-	-	ER	7	0.315 [8.0]	0.157 [4.0]	2000	-	-	-	-
IHHP-0806AB-01	-	-	ER	7	0.315 [8.0]	0.157 [4.0]	2000	-	-	-	-
IHHP-1008AZ-01	-	-	ER	7	0.315 [8.0]	0.157 [4.0]	3000	-	-	-	-
IHHP-1008AB-01	-	-	ER	7	0.315 [8.0]	0.157 [4.0]	3000	-	-	-	-
IHHP-1212ZH-01	-	-	ER	7	0.315 [8.0]	0.157 [4.0]	3000	-	-	-	-
IHHP-1212AZ-01	-	-	ER	7	0.315 [8.0]	0.157 [4.0]	3000	-	-	-	-
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	-	-	-	-
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-0805-01	-	-	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	-	-	-	-

Production Part Approval Process

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

Cross Section Photo

IHLD3232HBER100M5A



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.

Production **P**art **A**pproval **P**rocess

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

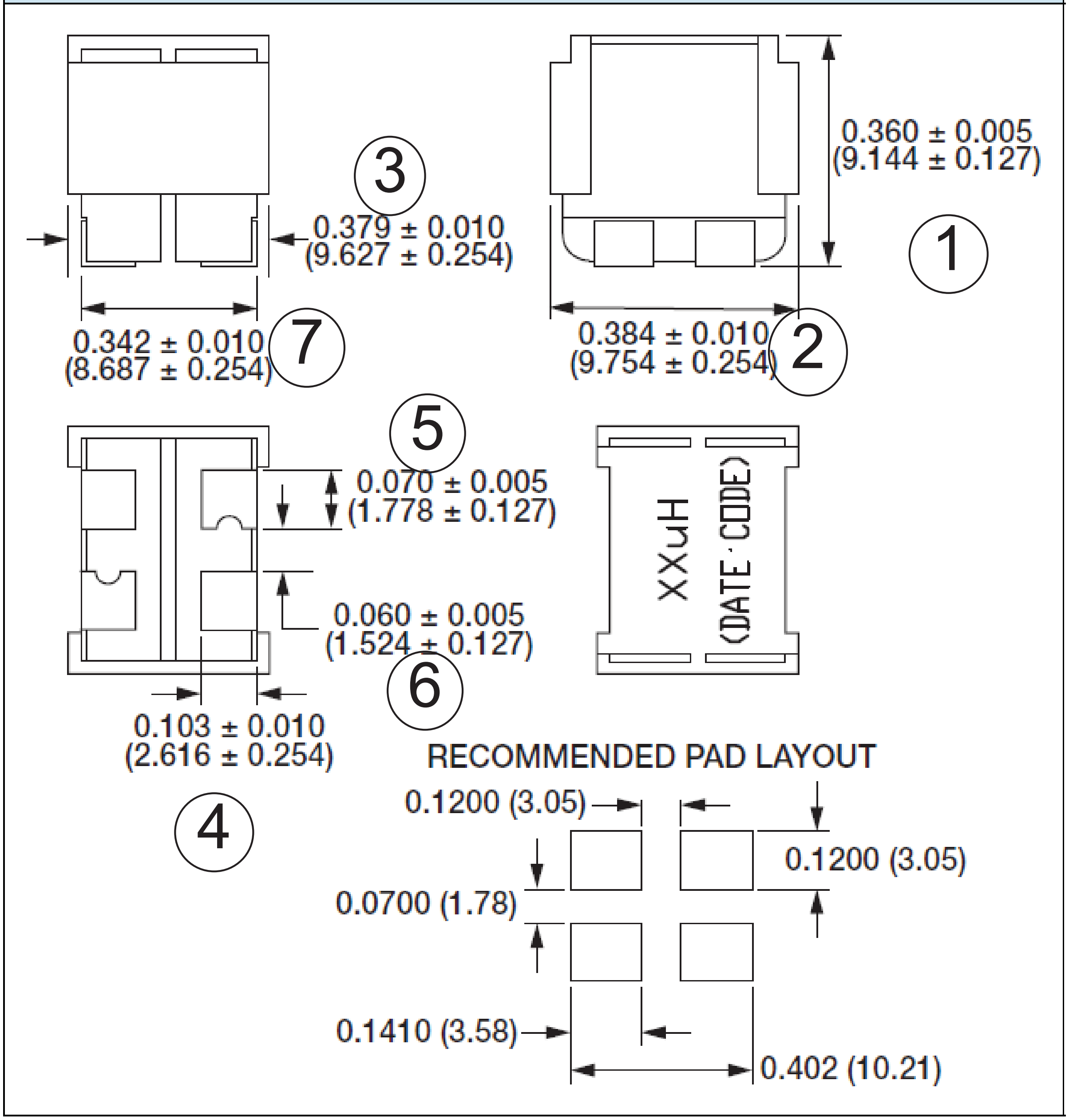
Use the control buttons below to navigate through the PPAP sections.

Section 3: Customer Engineering Approval

Customer Engineering Approval does not apply for this part number

IHLD3232HBERxxxM5A
DIMENSIONAL ANALYSIS

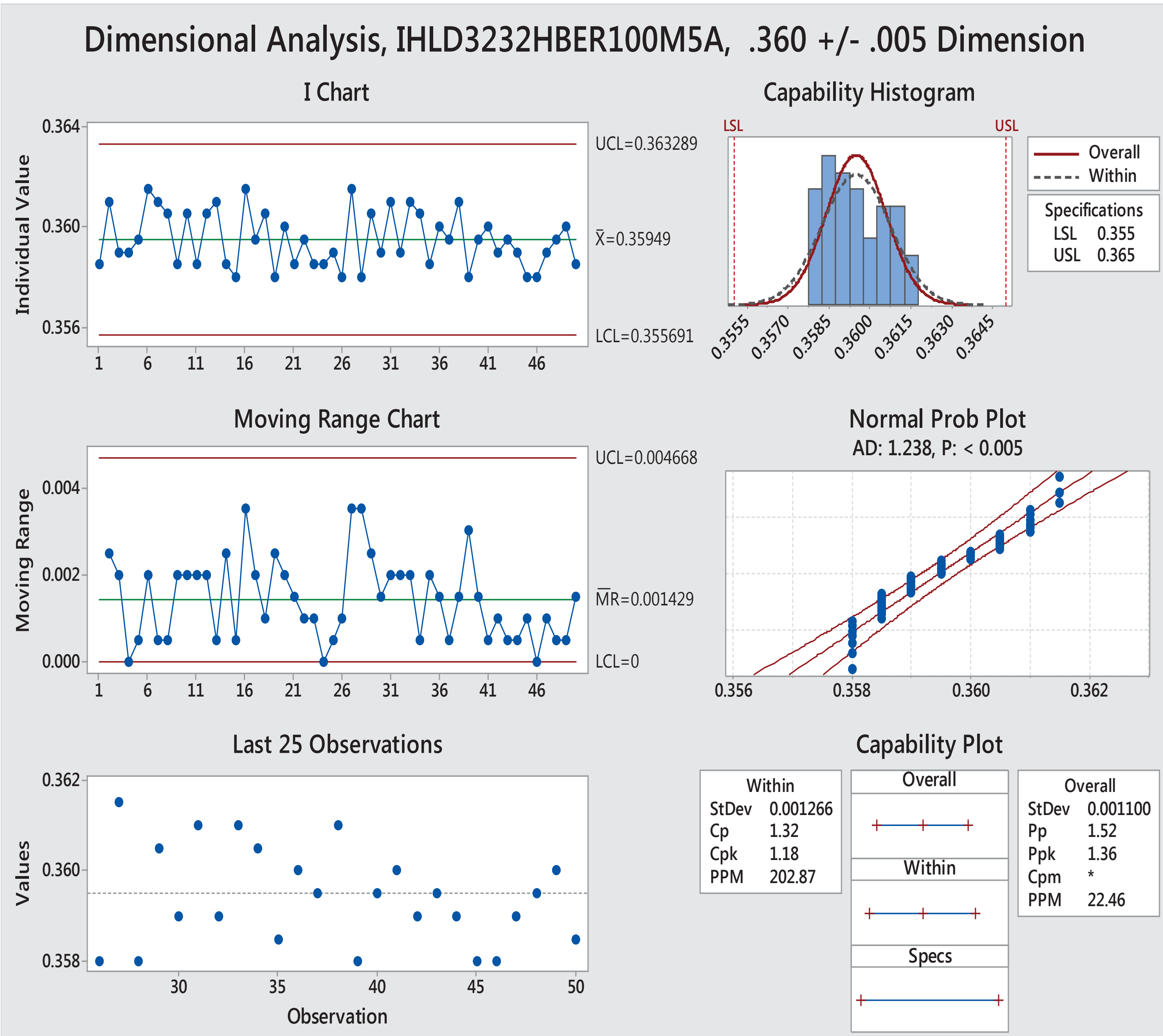
DIMENSIONS in inches [millimeters]



IHLD3232HBER100M5A
DIMENSIONAL ANALYSIS

	1	2	3	4	5	6	7
Nominal	0.36	0.384	0.379	0.103	0.07	0.06	0.342
Min	0.355	0.374	0.369	0.093	0.065	0.055	0.332
Max	0.365	0.394	0.389	0.113	0.075	0.065	0.352
1	0.3585	0.3835	0.377	0.1035	0.0685	0.061	0.3385
2	0.361	0.3855	0.3785	0.104	0.0695	0.062	0.3425
3	0.359	0.3835	0.3775	0.1025	0.069	0.061	0.34
4	0.359	0.3845	0.378	0.1035	0.0705	0.0595	0.3385
5	0.3595	0.3855	0.3765	0.106	0.07	0.061	0.3405
6	0.3615	0.3855	0.3765	0.104	0.0705	0.0615	0.3395
7	0.361	0.3845	0.3785	0.105	0.07	0.061	0.3405
8	0.3605	0.384	0.3795	0.1035	0.0705	0.062	0.3405
9	0.3585	0.3855	0.3795	0.103	0.069	0.0615	0.34
10	0.3605	0.3845	0.3815	0.107	0.071	0.061	0.3385
11	0.3585	0.3835	0.3775	0.1045	0.07	0.06	0.3385
12	0.3605	0.3855	0.379	0.1045	0.0685	0.0605	0.3395
13	0.361	0.3845	0.378	0.1	0.0695	0.0615	0.3395
14	0.3585	0.3855	0.3785	0.102	0.0705	0.061	0.339
15	0.358	0.3835	0.3795	0.1025	0.07	0.0605	0.339
16	0.3615	0.3855	0.378	0.104	0.07	0.0595	0.3395
17	0.3595	0.3825	0.3775	0.1035	0.069	0.062	0.3375
18	0.3605	0.3825	0.3785	0.103	0.07	0.0595	0.3395
19	0.358	0.3835	0.3785	0.1035	0.069	0.061	0.3395
20	0.36	0.3855	0.379	0.103	0.0685	0.0615	0.341
21	0.3585	0.384	0.3795	0.1045	0.069	0.061	0.3405
22	0.3595	0.385	0.38	0.1035	0.0705	0.062	0.3405
23	0.3585	0.3855	0.379	0.1025	0.069	0.0615	0.338
24	0.3585	0.382	0.379	0.106	0.0695	0.061	0.3375
25	0.359	0.382	0.3775	0.1035	0.0695	0.06	0.337
26	0.358	0.3825	0.378	0.1025	0.068	0.0605	0.34
27	0.3615	0.385	0.3835	0.1005	0.0705	0.0615	0.3395
28	0.358	0.3815	0.377	0.1025	0.0695	0.061	0.3395
29	0.3605	0.382	0.377	0.103	0.07	0.0615	0.3385
30	0.359	0.386	0.3815	0.1015	0.069	0.061	0.338
31	0.361	0.3845	0.379	0.105	0.071	0.0605	0.339
32	0.359	0.3825	0.3775	0.1025	0.0695	0.0595	0.3375
33	0.361	0.3865	0.3785	0.1055	0.0705	0.062	0.338
34	0.3605	0.387	0.3785	0.103	0.07	0.0595	0.34
35	0.3585	0.382	0.379	0.1035	0.07	0.061	0.341
36	0.36	0.3865	0.3785	0.105	0.0695	0.0615	0.34
37	0.3595	0.3825	0.3785	0.105	0.069	0.0615	0.3375
38	0.361	0.3835	0.3795	0.1035	0.0695	0.061	0.3395
39	0.358	0.3825	0.3785	0.1025	0.0705	0.0605	0.339
40	0.3595	0.385	0.3785	0.1035	0.069	0.0595	0.34
41	0.36	0.3855	0.3785	0.1045	0.0705	0.06	0.3415
42	0.359	0.3845	0.379	0.1025	0.0705	0.0595	0.3385
43	0.3595	0.384	0.3795	0.101	0.0695	0.061	0.3405
44	0.359	0.3845	0.3795	0.101	0.0705	0.0595	0.3395
45	0.358	0.3845	0.3795	0.102	0.069	0.0605	0.339
46	0.358	0.3865	0.3785	0.1025	0.0705	0.0605	0.34
47	0.359	0.3865	0.3795	0.1045	0.0685	0.06	0.3415
48	0.3595	0.385	0.379	0.103	0.07	0.0605	0.3385
49	0.36	0.3855	0.3775	0.103	0.0695	0.0595	0.3385
50	0.3585	0.3865	0.379	0.101	0.0685	0.059	0.3385

IHLD3232HBER100M5A DIMENSIONAL ANALYSIS



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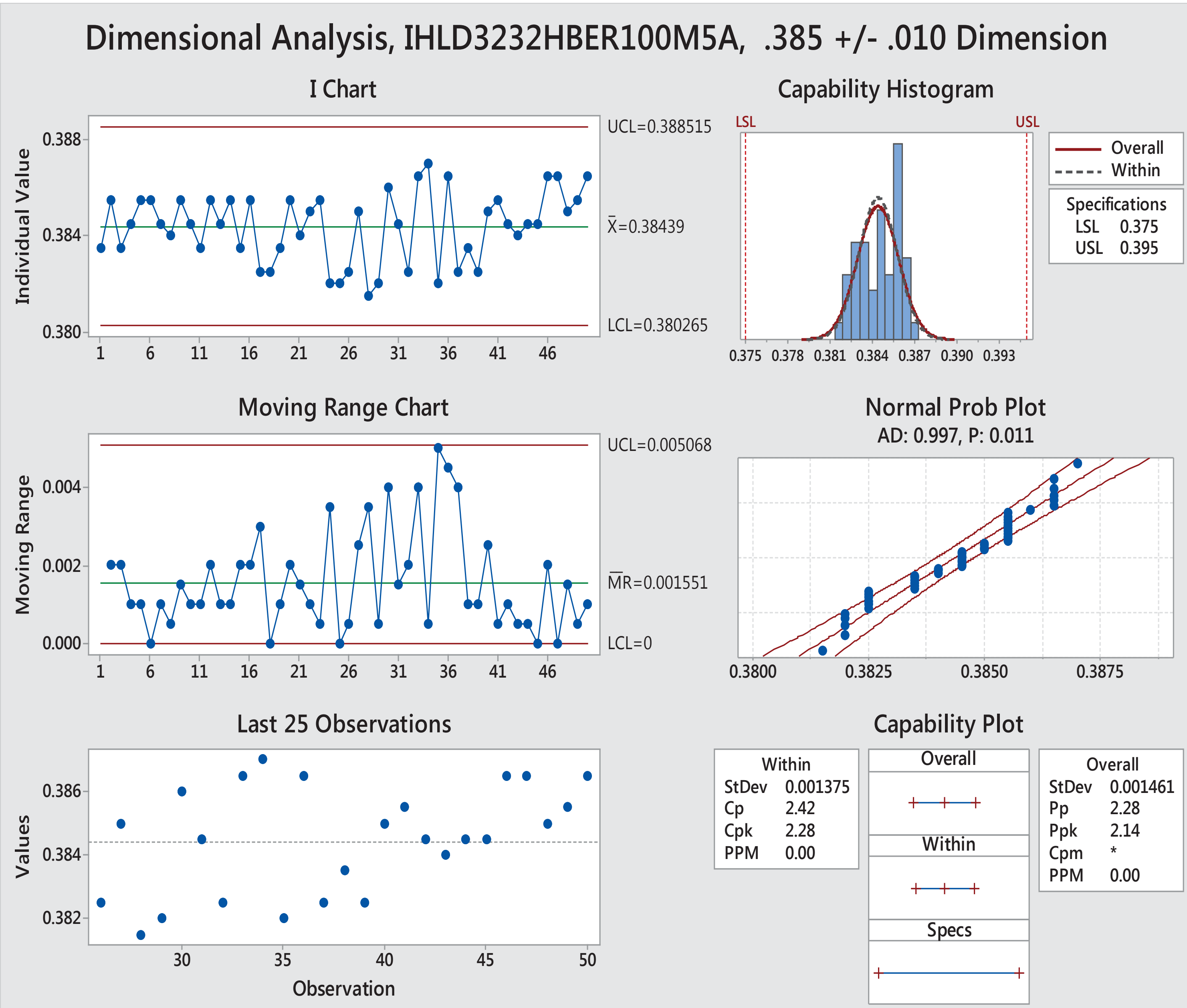
DIMENSIONAL ANALYSIS



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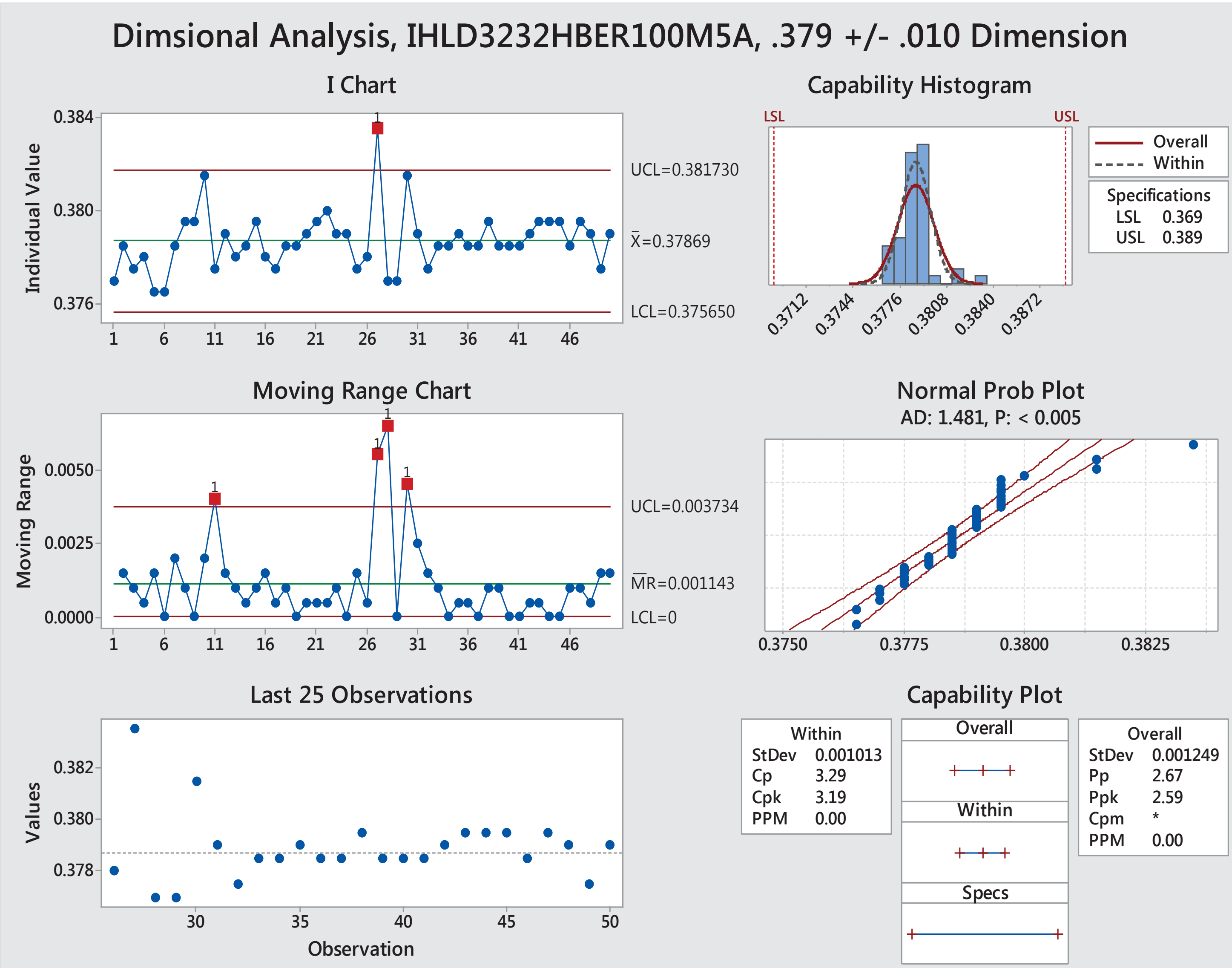

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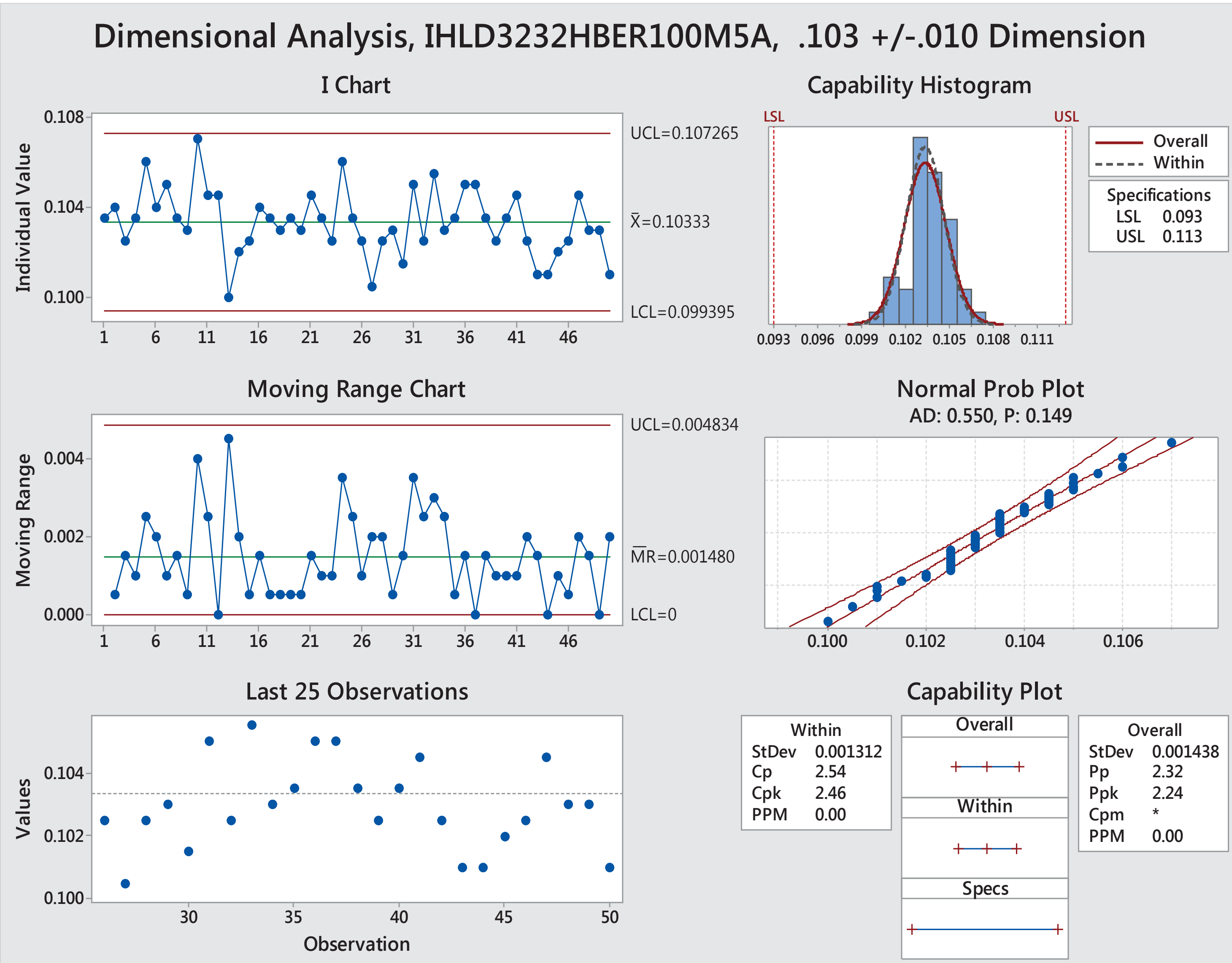

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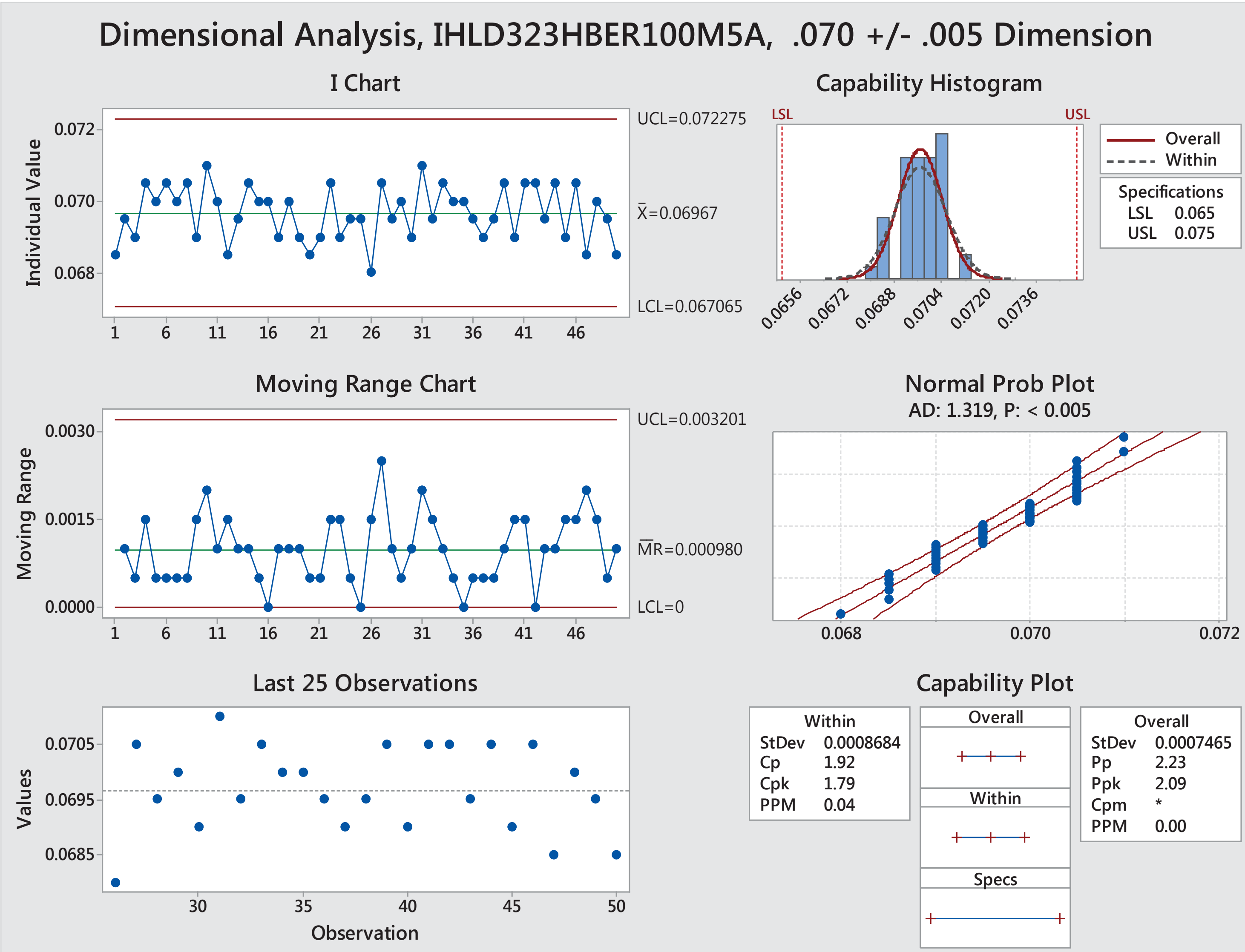

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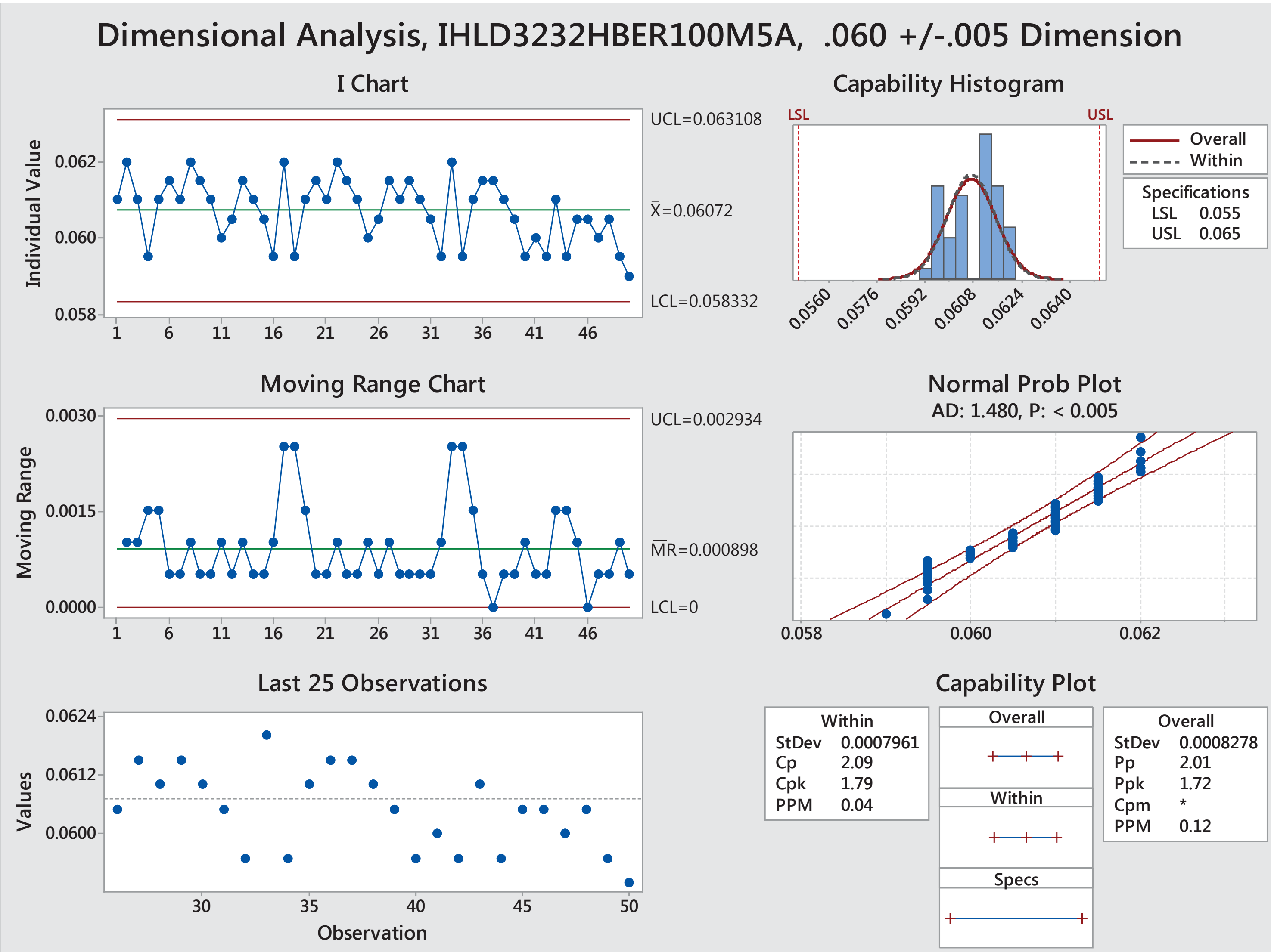

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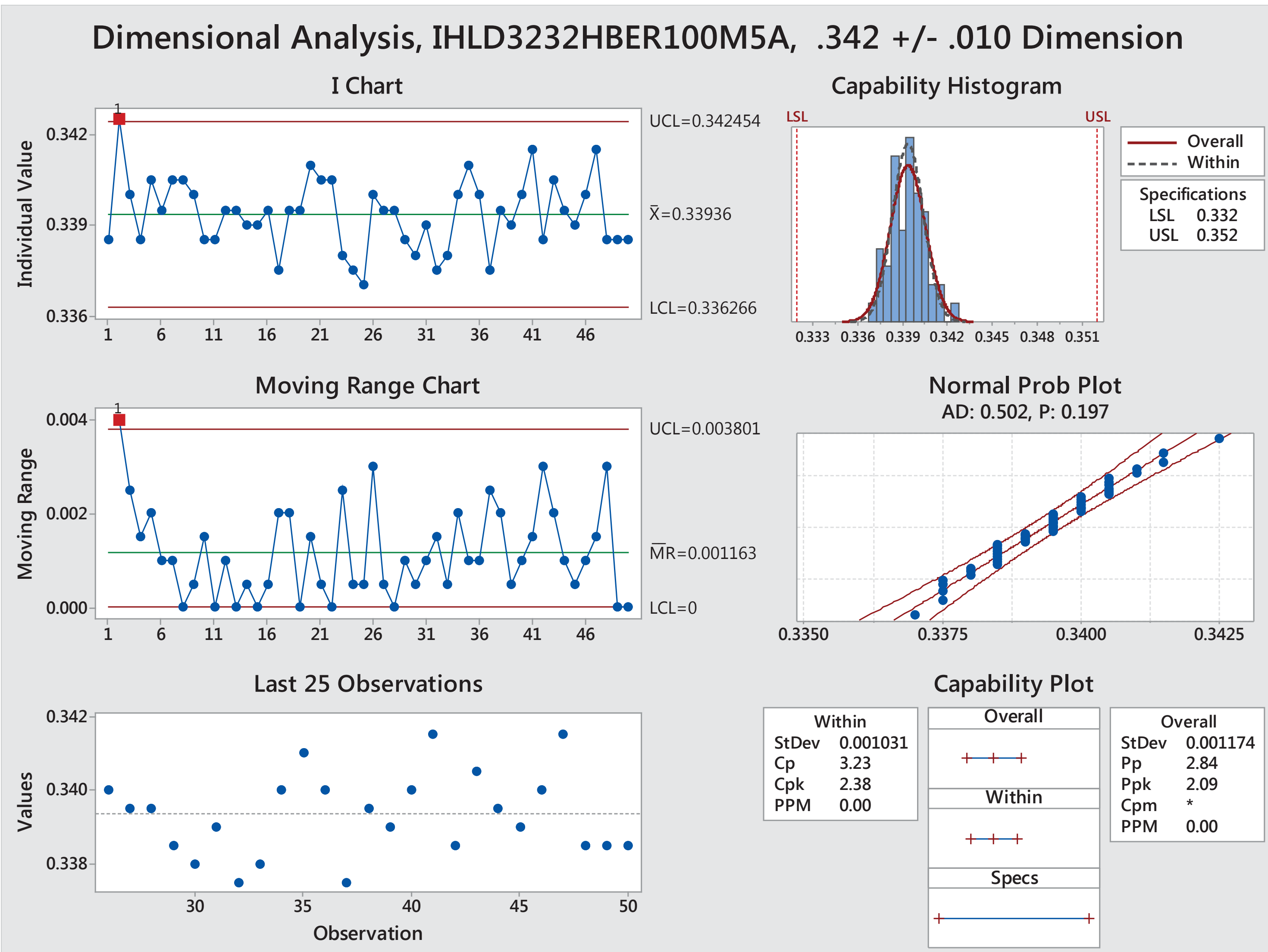

SECTION 10

PERFORMANCE TEST RESULTS

IHLD3232HB-5A

DANSHUI, CHINA MANUFACTURING LOCATION

A WORLD OF SOLUTIONS

IHLD3232HBER100M5A

Test #	Description	Ref. Spec Meth / Cond	Test Conditions	End Point Δ Requirements	Sample Size	Meas Temp	Summary Statistics	A L1-2 Results						B L3-4 Results					
0	Preconditioning for lead-free products	AEC-Q200 Rev C - Pb Free Specific Tests Table 4.2	As specified in sections 4.3.1 thru 4.3.3 except Visual per DPS-11,865 10X magnification	N/A	552	N/A	N/A	N/A						N/A					
1	Pre-mount Tolerance Check	IHLP Data Sheet	L (µH) - 100kHz and 250mV DCR - 25°C Ambient	L=±20% of initial, DCR =±20% of initial	3			Pass						Pass					
								Inductance (uH)			DC Resistance (mΩ)			Inductance (uH)			DC Resistance (mΩ)		
						25 ± 5°C (Ambient Temp)		Initial/Final		%Δ	Initial Final			Initial/Final		%Δ	Initial Final		
							Maximum	10.3846		3.846	49.010			10.4589		4.589	49.240		
							Minimum	9.4349		-5.651	48.740			9.3304		-6.696	48.710		
							Mean	9.98231		-0.1769	48.8800			9.88019		-1.1981	48.9600		
							Std Dev	0.49118		4.9118	0.1353			0.56481		5.6481	0.2663		
2	High Temperature Exposure	IEC-60068 Part 2-2 test group BA	T = +125°C for A1/1A models T = +155°C for -5A models T = +180°C for -8A models Duration = 2000 hours Power = Unpowered Readings at 0, 250, 500, 1000, 2000 hr intervals Initial and final readings at LT/RT/HT HT = +125°C for A1/1A models HT = +155°C for -5A models HT = +180°C for -8A models	L=±20% of initial, DCR =±20% of initial	77			Pass						Pass					
								Inductance (uH)			DC Resistance (mΩ)			Inductance (uH)			DC Resistance (mΩ)		
						-55°C		Initial	Final	%Δ	Initial	Final	%Δ	Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	10.2039	10.8719	6.994	34.110	33.540	0.479	10.2902	10.8703	6.765	34.170	33.450	0.662
							Minimum	8.5749	9.0444	3.930	32.960	32.300	-3.958	8.4515	8.8953	4.670	32.820	32.380	-3.630
							Mean	9.46401	10.01676	5.8234	33.3529	32.8138	-1.6108	9.32283	9.85452	5.6911	33.3286	32.8175	-1.5267
							Std Dev	0.51264	0.57436	0.5913	0.2568	0.2558	1.0537	0.51654	0.56796	0.4535	0.2887	0.2330	1.0410
								Inductance (uH)			DC Resistance (mΩ)			Inductance (uH)			DC Resistance (mΩ)		
						25°C		Initial	Final	%Δ	Initial	Final	%Δ	Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	10.2787	10.9413	7.010	48.590	48.930	1.158	10.3824	10.9534	6.692	48.530	48.890	1.292
							Minimum	8.6248	9.1256	4.621	47.450	47.100	-1.644	8.5167	8.9690	4.694	47.230	47.220	-1.036
							Mean	9.53206	10.09727	5.9159	48.0496	47.9043	-0.3028	9.39800	9.93582	5.7129	48.0157	47.9105	-0.2187
							Std Dev	0.51703	0.57367	0.5682	0.2263	0.4105	0.6624	0.52145	0.56944	0.4382	0.2227	0.3552	0.6355
								Inductance (uH)			DC Resistance (mΩ)			Inductance (uH)			DC Resistance (mΩ)		
						155°C		Initial	Final	%Δ	Initial	Final	%Δ	Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	10.3071	11.2779	10.174	72.860	72.170	1.080	10.3737	11.2997	10.028	72.570	72.100	1.111
							Minimum	8.6275	9.3465	7.264	70.170	69.760	-2.080	8.5167	9.1765	7.190	70.100	69.600	-2.043
							Mean	9.52455	10.37694	8.9219	71.5153	70.8869	-0.8762	9.39055	10.20724	8.6726	71.4652	70.9096	-0.7753
							Std Dev	0.50949	0.60648	0.7857	0.5721	0.5519	0.6859	0.51815	0.60769	0.6953	0.4963	0.4696	0.6166

IHLD3232HBER100M5A

								Pass						Pass					
								Inductance (uH)			DC Resistance (mΩ)			Inductance (uH)			DC Resistance (mΩ)		
								Initial	Final	%Δ	Initial	Final	%Δ	Initial	Final	%Δ	Initial	Final	%Δ
3	Low Temperature Storage	IEC-60068 Part 2-1 test group Aa	T = -55°C for all models Duration = 2000 hours Power = Unpowered Readings at 0, 250, 500, 1000, 2000 hr intervals Initial and final readings at LT/RT/HT HT = +125°C for A1/1A models HT = +155°C for -5A models HT = +180°C for -8A models	L=±20% of initial, DCR =±20% of initial	77	-55°C	Maximum	10.3075	10.4531	1.995	33.970	33.770	1.472	10.4083	10.5584	1.905	34.010	33.780	1.568
							Minimum	8.4434	8.5813	1.060	32.780	32.570	-2.747	8.4205	8.5565	1.157	32.830	32.640	-2.705
							Mean	9.38150	9.52292	1.5116	33.3451	33.0994	-0.7339	9.39171	9.53342	1.5134	33.3608	33.1351	-0.6735
							Std Dev	0.51055	0.51106	0.1277	0.2109	0.2373	0.8475	0.55471	0.55595	0.1245	0.2313	0.2539	0.8583
								Inductance (uH)			DC Resistance (mΩ)			Inductance (uH)			DC Resistance (mΩ)		
								Initial	Final	%Δ	Initial	Final	%Δ	Initial	Final	%Δ	Initial	Final	%Δ
						25°C	Maximum	10.3887	10.5223	1.909	48.620	49.300	2.534	10.5102	10.6344	1.721	48.510	49.240	2.647
							Minimum	8.5008	8.6263	1.064	47.190	47.410	-0.873	8.4876	8.6056	0.310	47.500	47.370	-0.544
							Mean	9.44873	9.57634	1.3552	48.0717	48.1208	0.1028	9.46765	9.59312	1.3313	48.1065	48.1721	0.1364
							Std Dev	0.51410	0.51304	0.1361	0.2448	0.3970	0.7476	0.56222	0.56002	0.1814	0.2379	0.4125	0.7042
								Inductance (uH)			DC Resistance (mΩ)			Inductance (uH)			DC Resistance (mΩ)		
								Initial	Final	%Δ	Initial	Final	%Δ	Initial	Final	%Δ	Initial	Final	%Δ
						155°C	Maximum	10.3793	10.4918	1.454	72.530	72.230	1.530	10.5018	10.6117	1.442	72.680	72.370	1.175
							Minimum	8.4950	8.6039	0.857	70.320	69.850	-1.780	8.4762	8.5867	0.154	70.090	69.940	-1.466
							Mean	9.44005	9.54463	1.1120	71.5684	71.1542	-0.5770	9.46151	9.55884	1.0330	71.6052	71.2468	-0.4990
							Std Dev	0.50870	0.50714	0.1224	0.4875	0.5425	0.7061	0.55718	0.55636	0.2138	0.5193	0.5511	0.6309

IHLD3232HBER100M5A

Test #	Description	Ref. Spec Meth / Cond	Test Conditions	End Point Δ Requirements	Sample Size	Meas Temp	Summary Statistics	A L1-2 Results						B L3-4 Results					
4	Temperature Cycling	IEC-60068, Part 2.14 test group Na	T = -55°C to +125°C for A1/1A models T = -55°C to +155°C for -5A models T = -55°C to +155°C for -8A models Dwell time = 30 min Transfer time ≤10 sec Duration = 1000 cycles Power = Unpowered Initial and final readings at LT/RT/HT HT = +125°C for A1/1A models HT = +155°C for -5A models HT = +180°C for -8A models	L=±20% of initial, DCR =±20% of initial	77			Pass						Pass					
								Inductance (uH)			DC Resistance (mΩ)			Inductance (uH)			DC Resistance (mΩ)		
						-55°C		Initial	Final	%Δ	Initial	Final	%Δ	Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	10.3366	10.5287	2.837	33.990	33.870	1.428	10.3749	10.5518	2.837	34.220	34.140	1.698
							Minimum	8.5147	8.7251	1.301	32.220	32.560	-1.143	8.6094	8.7666	1.273	32.400	32.570	-1.102
							Mean	9.43203	9.62568	2.0455	33.3183	33.1435	-0.5241	9.60058	9.80081	2.0811	33.3294	33.1784	-0.4521
							Std Dev	0.49786	0.52268	0.3221	0.2779	0.2930	0.4357	0.54110	0.56089	0.3187	0.2932	0.2990	0.4215
								Inductance (uH)			DC Resistance (mΩ)			Inductance (uH)			DC Resistance (mΩ)		
						25°C		Initial	Final	%Δ	Initial	Final	%Δ	Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	10.4181	10.5649	2.540	48.420	47.920	0.319	10.4690	10.6194	2.790	48.550	48.130	1.046
							Minimum	8.5716	8.7690	0.952	47.050	47.020	-2.148	8.6745	8.8124	0.876	46.830	46.800	-2.208
							Mean	9.49841	9.67098	1.8118	47.9684	47.5560	-0.8589	9.67928	9.85823	1.8469	47.9766	47.6071	-0.7686
							Std Dev	0.50150	0.52088	0.3382	0.2579	0.2277	0.3606	0.54844	0.56292	0.3632	0.3090	0.2633	0.4524
								Inductance (uH)			DC Resistance (mΩ)			Inductance (uH)			DC Resistance (mΩ)		
						155°C		Initial	Final	%Δ	Initial	Final	%Δ	Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	10.4185	10.7696	4.575	72.250	72.130	0.810	10.4642	10.8229	4.764	72.570	72.480	0.786
							Minimum	8.5826	8.9088	2.629	69.920	69.640	-1.224	8.6572	8.9384	2.503	69.950	69.700	-1.230
							Mean	9.48658	9.82744	3.5776	71.3229	71.0338	-0.4049	9.66308	10.02282	3.7083	71.3684	71.1165	-0.3530
							Std Dev	0.49410	0.54161	0.4751	0.4756	0.4773	0.3204	0.54261	0.58871	0.5029	0.5027	0.5347	0.2624

IHLD3232HBER100M5A

								Pass						Pass					
								Inductance (uH)			DC Resistance (mΩ)			Inductance (uH)			DC Resistance (mΩ)		
6	Bias Humidity	IEC-60068 Part 2-67	T = 85°C ± 20°C RH = 85% ± 5% Duration = 1000 hours Power = No Power Initial and final readings at LT/RT/HT HT = +125°C for A1/1A models HT = +155°C for -5A models HT = +180°C for -8A models	L=±20% of initial, DCR =±20% of initial	77	-55°C		Initial	Final	%Δ	Initial	Final	%Δ	Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	10.3675	10.5187	2.262	33.470	34.020	3.030	10.2443	10.3760	2.000	33.660	34.180	2.812
							Minimum	8.1834	8.3400	0.973	32.170	32.870	-0.269	8.0833	8.2239	0.917	32.350	33.030	-0.090
							Mean	9.41455	9.56116	1.5635	32.8623	33.4627	1.8307	9.29059	9.42801	1.4867	32.8595	33.4321	1.7464
							Std Dev	0.60367	0.60436	0.2395	0.2724	0.2314	0.7429	0.55198	0.54836	0.2212	0.2752	0.2213	0.7180
								Inductance (uH)			DC Resistance (mΩ)			Inductance (uH)			DC Resistance (mΩ)		
						25°C		Initial	Final	%Δ	Initial	Final	%Δ	Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	10.4439	10.5719	2.164	48.380	49.310	3.309	10.3208	10.4237	1.915	48.310	49.310	3.159
							Minimum	8.2472	8.3985	-1.101	46.880	48.090	1.668	8.1522	8.2844	0.663	47.180	48.290	1.234
							Mean	9.48231	9.61321	1.3925	47.7639	48.8139	2.1991	9.36238	9.48391	1.3098	47.7639	48.7713	2.1096
							Std Dev	0.60472	0.59647	0.4008	0.2592	0.2347	0.3257	0.55476	0.54334	0.2655	0.2318	0.2323	0.2966
								Inductance (uH)			DC Resistance (mΩ)			Inductance (uH)			DC Resistance (mΩ)		
						155°C		Initial	Final	%Δ	Initial	Final	%Δ	Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	10.4593	10.5845	2.025	72.230	73.930	4.098	10.3574	10.4337	1.970	72.230	73.740	6.453
							Minimum	8.2564	8.3945	0.932	69.280	71.620	1.523	8.1825	8.3187	0.737	69.270	71.430	1.620
							Mean	9.48757	9.62916	1.5029	70.9342	72.8796	2.7457	9.36866	9.50148	1.4284	70.9010	72.8157	2.7034
							Std Dev	0.60041	0.59381	0.2388	0.5925	0.4948	0.6267	0.54118	0.53166	0.2699	0.5343	0.5018	0.7105

IHLD3232HBER100M5A

Test #	Description	Ref. Spec Meth / Cond	Test Conditions	End Point Δ Requirements	Sample Size	Meas Temp	Summary Statistics	A L1-2 Results						B L3-4 Results					
7	Operational Life	MIL-STD-202, Method 108A	T = 85°C for -1A/A1 models T =115°C for -5A models T =140°C for -8A models Duration = 2000 hrs Power = 100% rated current continuous Readings at 0, 250, 500, 1000, 2000 hr intervals Initial and final readings at LT/RT/HT HT = +125°C for A1/1A models HT = +155°C for -5A models HT = +180°C for -8A models	L=±20% of initial, DCR =±20% of initial	77			Pass						Pass					
								Inductance (uH)			DC Resistance (mΩ)			Inductance (uH)			DC Resistance (mΩ)		
						-55°C		Initial	Final	%Δ	Initial	Final	%Δ	Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	10.3205	10.5798	3.721	34.040	33.400	0.610	10.0443	10.3200	3.349	34.070	33.260	0.365
							Minimum	8.2055	8.4346	2.265	32.590	32.160	-3.819	8.1094	8.3326	1.928	32.680	32.000	-3.981
							Mean	9.13422	9.39315	2.8288	33.2777	32.6730	-1.8121	9.13225	9.37720	2.6763	33.1891	32.5334	-1.9717
							Std Dev	0.48975	0.51408	0.3517	0.2920	0.2645	0.9357	0.48539	0.50971	0.3465	0.2639	0.2660	0.9095
								Inductance (uH)			DC Resistance (mΩ)			Inductance (uH)			DC Resistance (mΩ)		
						25°C		Initial	Final	%Δ	Initial	Final	%Δ	Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	10.3975	10.7258	4.499	48.990	48.870	2.216	10.1117	10.4787	4.085	49.080	48.960	1.798
							Minimum	8.2567	8.5448	2.705	46.480	46.780	-2.812	8.1791	8.4434	2.665	47.070	46.450	-2.987
							Mean	9.19043	9.51707	3.5488	48.0162	47.6279	-0.8026	9.19756	9.51514	3.4448	47.9323	47.3868	-1.1328
							Std Dev	0.48972	0.51672	0.3603	0.5407	0.5542	1.1446	0.48348	0.51542	0.3708	0.5101	0.5269	1.0867
								Inductance (uH)			DC Resistance (mΩ)			Inductance (uH)			DC Resistance (mΩ)		
						155°C		Initial	Final	%Δ	Initial	Final	%Δ	Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	10.3943	10.8140	6.123	72.280	72.040	2.390	10.1194	10.5897	5.909	71.730	71.580	2.026
							Minimum	8.2665	8.5642	3.426	69.820	69.180	-2.270	8.2000	8.5048	3.295	69.300	68.540	-2.551
							Mean	9.19722	9.62071	4.5916	70.8864	70.6191	-0.3748	9.20319	9.63163	4.6391	70.6623	70.0581	-0.8516
							Std Dev	0.47727	0.52423	0.6080	0.5772	0.6998	0.8818	0.47073	0.52468	0.6380	0.5809	0.6405	0.9364
8	External Visual Insp.	MIL-STD-883 Method 2009	Inspect device construction, workmanship and marking. Electrical testing not req.	Pass criteria defined in DPS-11,865VA1	30	N/A	N/A	Pass											
9	Dimensions	JESD22, Method JB-100	Verify physical dimensions to part specification	All parts within dimensional tolerance	30	N/A	N/A	Pass											
10	Resistance to Solvents	MIL-STD-202 Method 215	OKEM clean or equivalent	Pass criteria defined in DPS-11,865VA1	5	N/A	N/A	Pass											

IHLD3232HBER100M5A

11	Mechanical Shock	IEC-60068 part 2.27 test group Ea	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 HT = +125°C for A1/1A models HT = +155°C for -5A models HT = +180°C for -8A models	L=±20% of initial, DCR =±20% of initial	30

		Pass						Pass					
		Inductance (uH)			DC Resistance (mΩ)			Inductance (uH)			DC Resistance (mΩ)		
-55°C		Initial	Final	%Δ	Initial	Final	%Δ	Initial	Final	%Δ	Initial	Final	%Δ
	Maximum	10.0434	10.1046	1.085	33.560	33.770	1.412	10.0746	10.1064	0.995	33.590	33.730	1.408
	Minimum	8.1515	8.1776	0.255	32.230	32.490	-0.450	8.2587	8.3183	0.066	32.410	32.720	-0.210
	Mean	9.04167	9.09155	0.5515	32.7600	33.0207	0.7985	9.22154	9.26672	0.4905	32.8400	33.1147	0.8387
	Std Dev	0.54837	0.55190	0.2561	0.3363	0.2689	0.4365	0.52058	0.52255	0.2475	0.3106	0.2522	0.4118
		Inductance (uH)			DC Resistance (mΩ)			Inductance (uH)			DC Resistance (mΩ)		
25°C		Initial	Final	%Δ	Initial	Final	%Δ	Initial	Final	%Δ	Initial	Final	%Δ
	Maximum	10.1034	10.1742	1.217	48.100	48.600	1.430	10.1555	10.1929	1.263	48.260	48.800	1.799
	Minimum	8.2066	8.2296	0.176	46.970	46.990	0.043	8.3167	8.3868	0.104	47.170	47.520	0.334
	Mean	9.10126	9.15301	0.5697	47.5850	47.9823	0.8342	9.28762	9.33733	0.5360	47.6890	48.1353	0.9357
	Std Dev	0.54789	0.54972	0.3042	0.2836	0.3834	0.3400	0.52202	0.52458	0.3063	0.2784	0.3439	0.3418
		Inductance (uH)			DC Resistance (mΩ)			Inductance (uH)			DC Resistance (mΩ)		
155°C		Initial	Final	%Δ	Initial	Final	%Δ	Initial	Final	%Δ	Initial	Final	%Δ
	Maximum	10.1309	10.1419	0.470	71.170	71.620	2.204	10.1305	10.1302	0.411	71.360	72.190	2.131
	Minimum	8.1761	8.1905	0.007	69.260	69.040	-0.318	8.3134	8.3231	-0.181	69.790	70.230	-0.070
	Mean	9.08769	9.09936	0.1295	70.2867	70.6657	0.5391	9.26443	9.27526	0.1185	70.4573	70.9223	0.6604
	Std Dev	0.53921	0.53832	0.0878	0.4070	0.6154	0.6438	0.51836	0.51651	0.1167	0.4043	0.5346	0.5809

IHLD3232HBER100M5A

Test #	Description	Ref. Spec Meth / Cond	Test Conditions	End Point Δ Requirements	Sample Size	Meas Temp	Summary Statistics	A L1-2 Results						B L3-4 Results					
12	Vibration	IEC-60068 PART 2-6 TEST GROUP Fc.	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 HT = +125°C for A1/1A models HT = +155°C for -5A models HT = +180°C for -8A models	L=±20% of initial, DCR =±20% of initial	30			Pass						Pass					
								Inductance (uH)			DC Resistance (mΩ)			Inductance (uH)			DC Resistance (mΩ)		
						-55°C		Initial	Final	%Δ	Initial	Final	%Δ	Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	9.8223	9.9276	1.136	33.570	33.830	2.563	9.6739	9.7001	1.253	33.640	33.870	2.435
							Minimum	8.1367	8.1776	0.414	32.710	33.030	-0.508	8.0762	8.1099	-0.372	32.570	33.000	-0.449
							Mean	8.79379	8.84920	0.6276	33.0223	33.3980	1.1408	8.86779	8.91407	0.5277	33.0293	33.4107	1.1570
							Std Dev	0.53139	0.53905	0.1848	0.2121	0.1701	0.7132	0.47220	0.46494	0.2669	0.2347	0.2240	0.6736
								Inductance (uH)			DC Resistance (mΩ)			Inductance (uH)			DC Resistance (mΩ)		
						25°C		Initial	Final	%Δ	Initial	Final	%Δ	Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	10.0081	9.9758	-0.244	48.020	48.140	1.037	9.8808	9.7877	0.001	48.160	48.140	1.056
							Minimum	8.3129	8.2406	-1.103	47.240	47.140	-0.524	8.2721	8.1743	-1.747	46.930	47.050	-0.444
							Mean	8.97906	8.90352	-0.8474	47.6120	47.7157	0.2183	9.06044	8.98255	-0.8572	47.6127	47.7377	0.2632
							Std Dev	0.53168	0.53751	0.2142	0.1945	0.2018	0.3650	0.47378	0.46594	0.3151	0.2693	0.2627	0.3622
								Inductance (uH)			DC Resistance (mΩ)			Inductance (uH)			DC Resistance (mΩ)		
						155°C		Initial	Final	%Δ	Initial	Final	%Δ	Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	10.0511	9.9238	-1.145	71.800	72.190	1.305	9.8649	9.7122	-1.141	72.400	72.440	1.387
							Minimum	8.3204	8.1886	-1.791	70.570	70.430	-0.864	8.2661	8.1136	-1.887	70.100	70.550	-0.819
							Mean	8.98706	8.85049	-1.5266	71.1010	71.3523	0.3545	9.06311	8.92765	-1.4985	71.1113	71.3813	0.3816
							Std Dev	0.52676	0.53019	0.1565	0.3237	0.4415	0.6192	0.44860	0.44934	0.2004	0.4859	0.4933	0.6352
13	Bump	IEC-60068 part 2- 29 test group Eb	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 HT = +125°C for A1/1A models HT = +155°C for -5A models HT = +180°C for -8A models	L=±20% of initial, DCR =±20% of initial	30			Pass						Pass					
								Inductance (uH)			DC Resistance (mΩ)			Inductance (uH)			DC Resistance (mΩ)		
						-55°C		Initial	Final	%Δ	Initial	Final	%Δ	Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	9.6789	9.8382	2.677	33.660	33.450	1.536	9.5024	9.6954	2.574	33.660	33.520	1.558
							Minimum	8.1179	8.2946	1.496	32.460	32.500	-1.396	8.2647	8.4655	1.448	32.520	32.570	-1.576
							Mean	8.88194	9.06056	2.0198	32.9990	33.0010	0.0100	8.88542	9.06240	1.9955	33.0440	33.0347	-0.0246
							Std Dev	0.52323	0.52077	0.3861	0.3068	0.2423	0.7088	0.40421	0.40577	0.3115	0.2414	0.1841	0.7355
								Inductance (uH)			DC Resistance (mΩ)			Inductance (uH)			DC Resistance (mΩ)		
						25°C		Initial	Final	%Δ	Initial	Final	%Δ	Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	9.7488	9.8997	2.615	48.720	48.970	1.367	9.5556	9.7511	2.614	48.680	48.950	1.243
							Minimum	8.1682	8.3445	1.415	47.400	47.320	-0.884	8.3329	8.5277	1.388	47.380	47.320	-0.828
							Mean	8.94316	9.11157	1.8928	48.1137	48.1453	0.0668	8.95336	9.12605	1.9327	48.1540	48.1890	0.0730
							Std Dev	0.52457	0.51971	0.3827	0.3463	0.3701	0.5281	0.40204	0.40291	0.3560	0.2686	0.3432	0.5167
								Inductance (uH)			DC Resistance (mΩ)			Inductance (uH)			DC Resistance (mΩ)		
						155°C		Initial	Final	%Δ	Initial	Final	%Δ	Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	9.6767	9.7973	1.645	71.120	72.200	2.416	9.5268	9.6630	1.666	71.410	72.060	1.980
							Minimum	8.1452	8.2718	1.219	69.540	69.700	-0.481	8.3369	8.4642	1.230	69.960	69.910	-0.507
							Mean	8.91349	9.04042	1.4292	70.5710	70.9930	0.5992	8.92633	9.05793	1.4763	70.6837	71.0513	0.5224
							Std Dev	0.50785	0.50678	0.1365	0.4175	0.5876	0.7728	0.38897	0.39055	0.1107	0.4202	0.4840	0.7627
14	Resistance to Soldering Heat	MIL-STD-202 Method 210	Condition K, except temperature to be 260°C +/- 5°C	L=±20% of initial, DCR =±20% of initial	30			Pass						Pass					
								Inductance (uH)			DC Resistance (mΩ)			Inductance (uH)			DC Resistance (mΩ)		
						25 ± 5°C (Ambient Temp)		Initial	Final	%Δ	Initial	Final	%Δ	Initial	Final	%Δ	Initial	Final	%Δ
							Maximum	9.8504	9.8594	0.804	48.820	49.020	0.952	9.6729	9.6712	0.840	48.780	49.020	0.783
							Minimum	8.0744	8.1359	-0.554	47.920	48.110	-0.942	8.0315	8.0855	-0.657	47.880	48.170	-0.473
							Mean	8.77059	8.79257	0.2514	48.4883	48.6203	0.2727	8.79456	8.81277	0.2132	48.5177	48.6460	0.2649
							Std Dev	0.47176	0.47290	0.3427	0.2417	0.2610	0.3784	0.47363	0.46585	0.3934	0.2114	0.2212	0.3081
15	ESD	AEC-Q200-002	Determine the Classification of the part.	L=±20% of initial, DCR =±20% of initial	15			Pass						Pass					
								Inductance (uH)			DC Resistance (mΩ)			Inductance (uH)			DC Resistance (mΩ)		
						25 ± 5°C (Ambient Temp)		Initial	25KV	%Δ	Initial	25KV	%Δ	Initial	25KV	%Δ	Initial	25KV	%Δ
							Maximum	10.0605	10.1106	0.892	49.220	49.450	0.532	10.0387	10.0635	0.673	49.140	49.380	0.532
							Minimum	8.3283	8.3649	0.363	48.540	48.770	0.225	8.5087	8.5582	-0.073	48.430	48.670	0.184
							Mean	9.25511	9.31001	0.5933	48.9233	49.1213	0.4049	9.40187	9.43651	0.3712	48.8653	49.0633	0.4053
							Std Dev	0.48525	0.48797	0.1572	0.2001	0.1862	0.1005	0.45919	0.45581	0.2061	0.1996	0.1933	0.1128

IHLD3232HBER100M5A

16.3	Solderability	J-STD-002 Method S1	**Dry heat** = 16 hrs @ 155°C **Solder** = SnAgCu (96/3.5/0.5)% T = 230°C	95% coverage of each individual terminal are coated with new solder	15	N/A	N/A	Pass
18	Board Flex	AEC-Q200-005	2mm minimum flex for 60 (+5) sec	L=±20% of initial, DCR =±20% of initial	30	25 ± 5°C (Ambient Temp)		
19	Terminal Strength	AEC-Q200-006	Force of 1.8kg (17.7 N) for 60 seconds	L=±20% of initial, DCR =±20% of initial	30	25 ± 5°C (Ambient Temp)		

	Pass							Pass						
	Inductance (uH)			DC Resistance (mΩ)				Inductance (uH)			DC Resistance (mΩ)			
	Initial	Final	%Δ	Initial	Flexed	Final	%Δ	Initial	Final	%Δ	Initial	Flexed	Final	%Δ
Maximum	10.3199	10.3651	0.530	49.340	49.960	49.230	0.145	10.2303	10.2916	0.599	49.210	49.860	49.190	0.143
Minimum	8.4264	8.4500	0.223	47.800	48.480	47.780	-0.750	8.5427	8.5846	0.072	47.970	48.530	47.920	-0.495
Mean	9.26131	9.29504	0.3626	48.4643	49.1327	48.4010	-0.1302	9.37243	9.41066	0.4062	48.7193	49.2963	48.6610	-0.1199
Std Dev	0.48800	0.49289	0.0871	0.4265	0.4233	0.4039	0.1643	0.48524	0.49044	0.0932	0.3827	0.3948	0.3975	0.1359

	Pass						Pass					
	Inductance (uH)			DC Resistance (mΩ)			Inductance (uH)			DC Resistance (mΩ)		
	Initial	Final	%Δ	Initial	Final	%Δ	Initial	Final	%Δ	Initial	Final	%Δ
Maximum	10.4417	10.4588	0.629	49.400	49.280	0.409	10.3408	10.3568	0.413	49.110	49.180	0.476
Minimum	8.6712	8.6951	-0.187	48.050	48.130	-0.392	8.3790	8.3757	-0.039	48.090	48.190	-0.350
Mean	9.53386	9.55378	0.2080	48.6727	48.7433	0.1458	8.97877	8.98693	0.0904	48.6057	48.6910	0.1761
Std Dev	0.41724	0.42079	0.2113	0.3356	0.3081	0.2336	0.36658	0.36845	0.1247	0.3143	0.2959	0.2282

Production Part Approval Process

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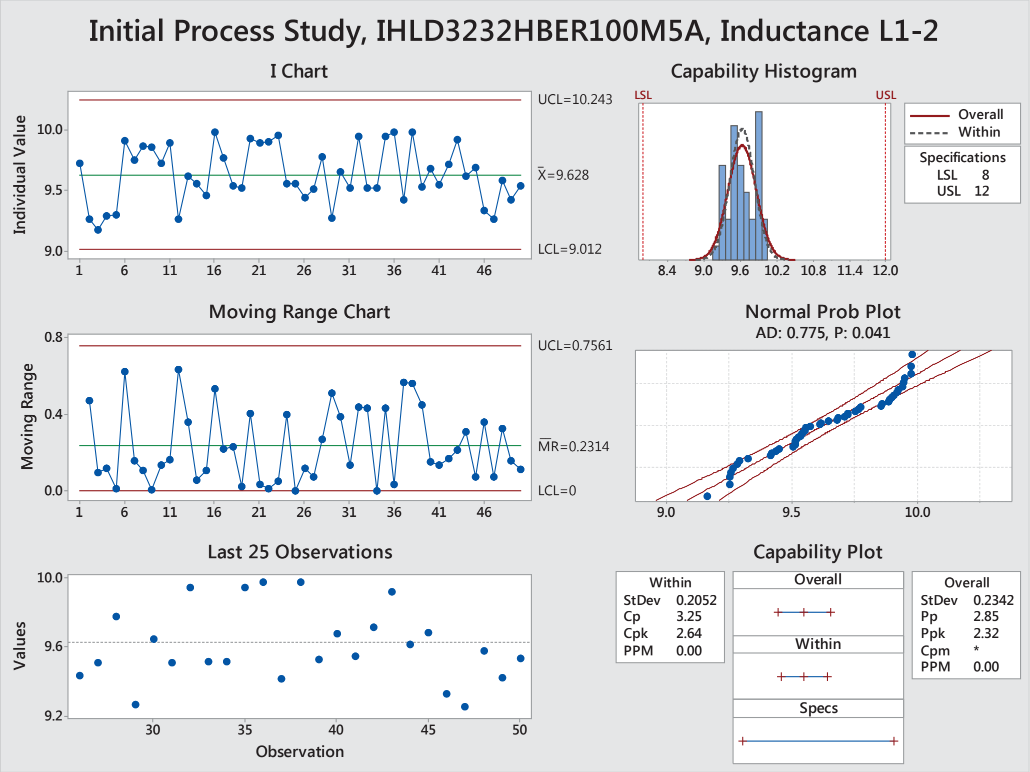
Initial Process Study
IHLD3232HBER100M5A, Inductance L1-2

Inductance (uH)			
1	9.725	26	9.435
2	9.258	27	9.506
3	9.165	28	9.774
4	9.282	29	9.264
5	9.291	30	9.647
6	9.908	31	9.512
7	9.752	32	9.947
8	9.859	33	9.516
9	9.855	34	9.516
10	9.723	35	9.944
11	9.886	36	9.976
12	9.255	37	9.415
13	9.613	38	9.975
14	9.555	39	9.527
15	9.451	40	9.679
16	9.982	41	9.544
17	9.767	42	9.712
18	9.538	43	9.921
19	9.519	44	9.615
20	9.923	45	9.685
21	9.891	46	9.326
22	9.901	47	9.255
23	9.949	48	9.576
24	9.551	49	9.422
25	9.552	50	9.535



Production Part Approval Process

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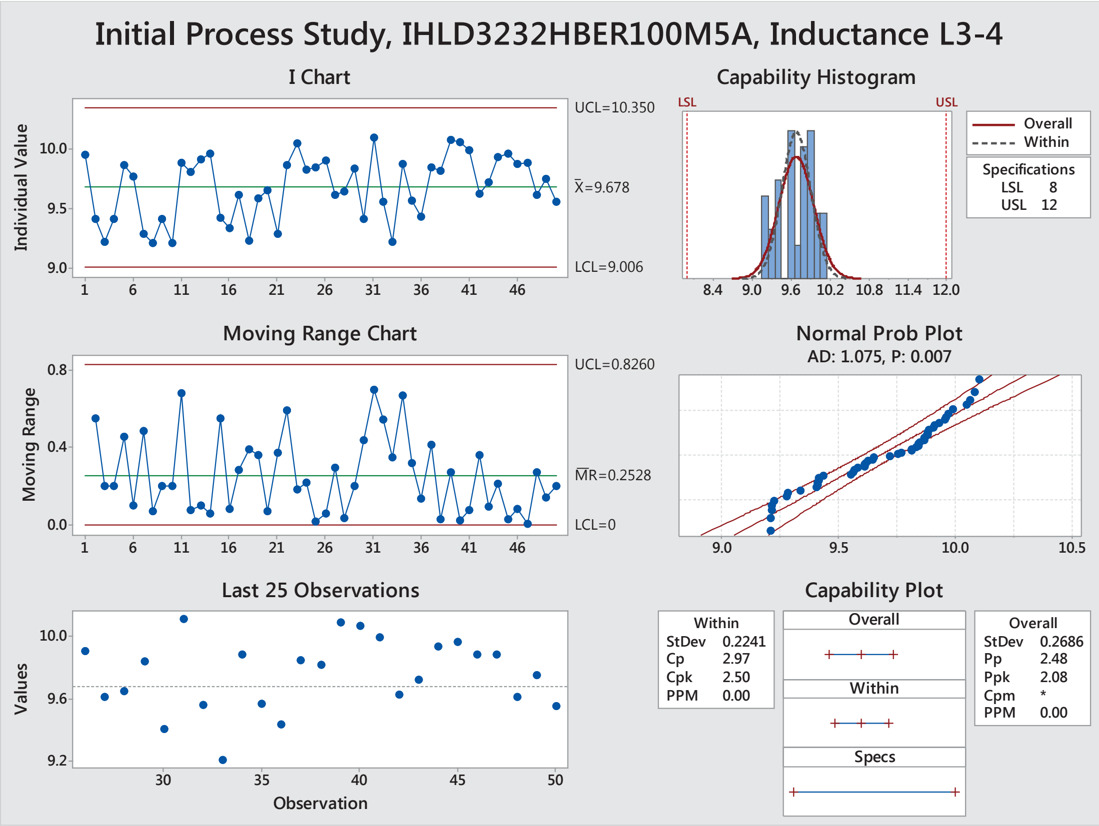
Initial Process Study
IHLD3232HBER100M5A, Inductance L3-4

Inductance (uH)			
1	9.957	26	9.904
2	9.41	27	9.611
3	9.212	28	9.644
4	9.413	29	9.841
5	9.865	30	9.406
6	9.767	31	10.105
7	9.282	32	9.561
8	9.21	33	9.212
9	9.409	34	9.882
10	9.209	35	9.566
11	9.888	36	9.433
12	9.814	37	9.844
13	9.913	38	9.815
14	9.968	39	10.083
15	9.417	40	10.062
16	9.335	41	9.989
17	9.615	42	9.627
18	9.225	43	9.721
19	9.584	44	9.933
20	9.652	45	9.961
21	9.28	46	9.878
22	9.869	47	9.884
23	10.05	48	9.614
24	9.831	49	9.752
25	9.847	50	9.552



Production Part Approval Process

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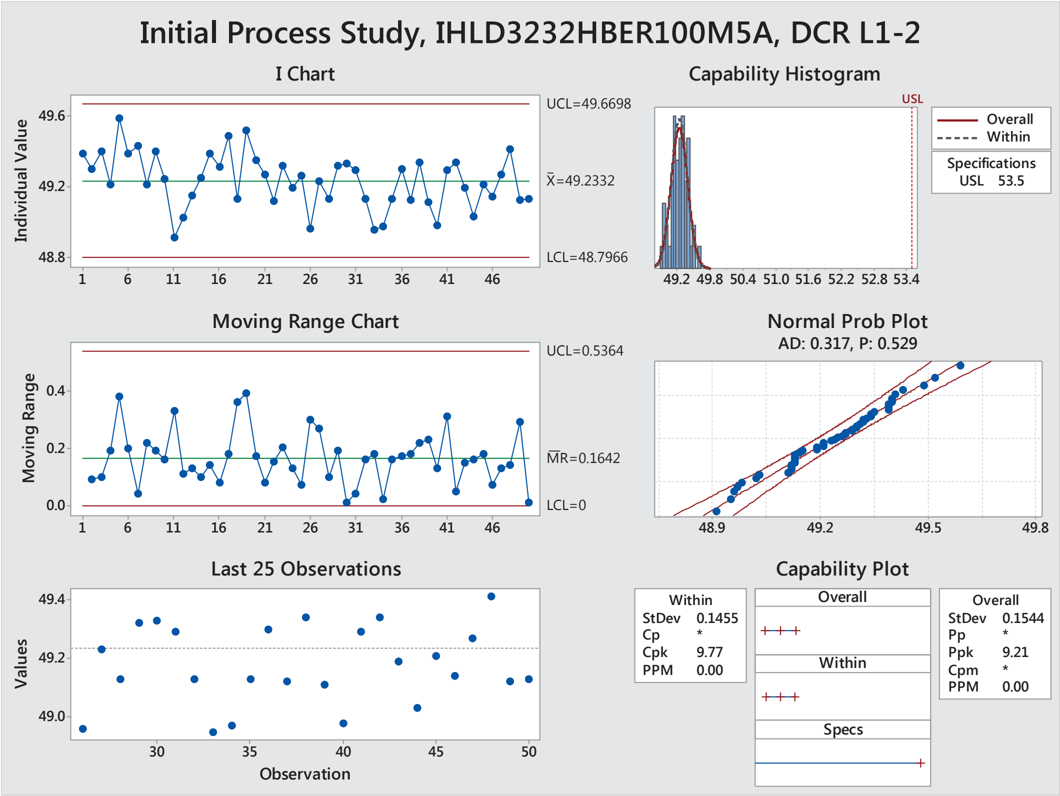
Initial Process Study
IHLD3232HBER100M5A, DC Resistance L1-2

DCR (mOhm)			
1	49.39	26	48.96
2	49.3	27	49.23
3	49.4	28	49.13
4	49.21	29	49.32
5	49.59	30	49.33
6	49.39	31	49.29
7	49.43	32	49.13
8	49.21	33	48.95
9	49.4	34	48.97
10	49.24	35	49.13
11	48.91	36	49.3
12	49.02	37	49.12
13	49.15	38	49.34
14	49.25	39	49.11
15	49.39	40	48.98
16	49.31	41	49.29
17	49.49	42	49.34
18	49.13	43	49.19
19	49.52	44	49.03
20	49.35	45	49.21
21	49.27	46	49.14
22	49.118	47	49.27
23	49.32	48	49.41
24	49.19	49	49.12
25	49.26	50	49.13



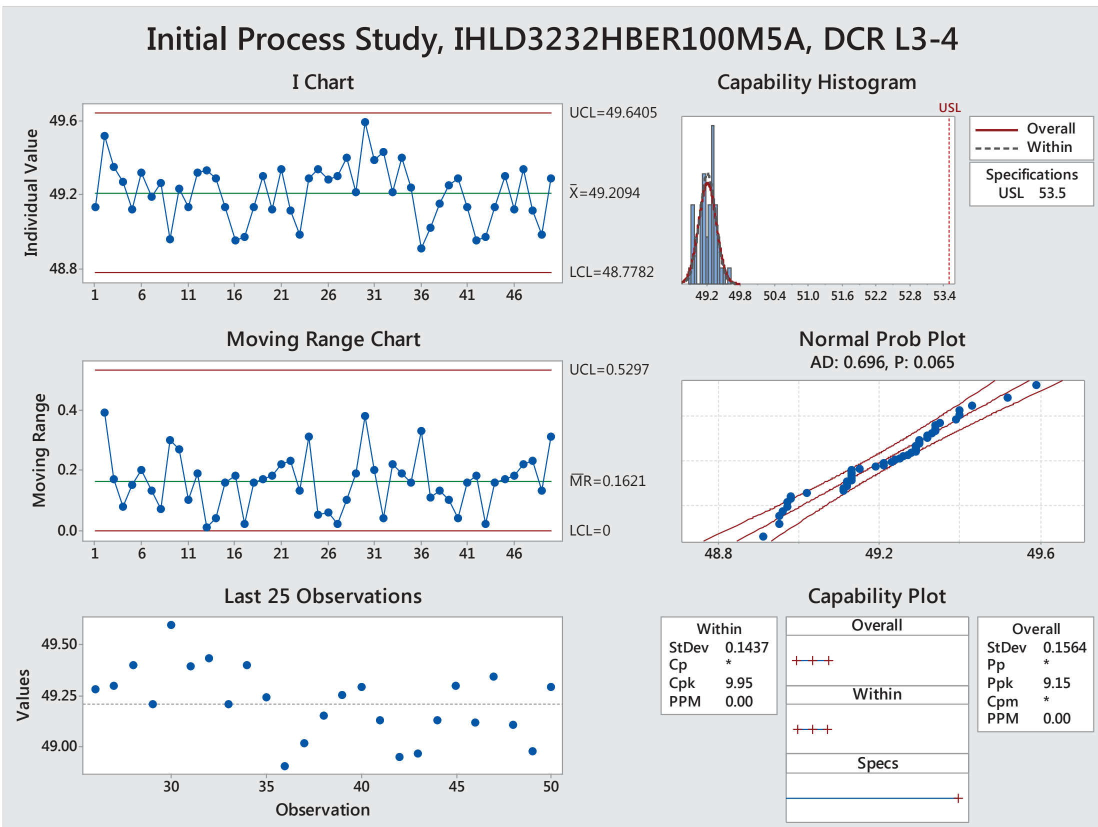
VISHAY.

Production Part Approval Process

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

Initial Process Study
IHLD3232HBER100M5A, DC Resistance L3-4

DCR (mOhm)			
1	49.13	26	49.28
2	49.52	27	49.3
3	49.35	28	49.4
4	49.27	29	49.21
5	49.118	30	49.59
6	49.32	31	49.39
7	49.19	32	49.43
8	49.26	33	49.21
9	48.96	34	49.4
10	49.23	35	49.24
11	49.13	36	48.91
12	49.32	37	49.02
13	49.33	38	49.15
14	49.29	39	49.25
15	49.13	40	49.29
16	48.95	41	49.13
17	48.97	42	48.95
18	49.13	43	48.97
19	49.3	44	49.13
20	49.12	45	49.3
21	49.34	46	49.12
22	49.11	47	49.34
23	48.98	48	49.11
24	49.29	49	48.98
25	49.34	50	49.29



Production Part Approval Process

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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

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 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

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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

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Section 15: Master Sample

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

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Section 16: Checking Aids

Checking Aids are not required for this electronic component

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Section 17: Records of Compliance

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Production Part Approval Process

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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.

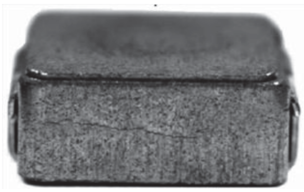
The IHLP inductor provides the best combination of:

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

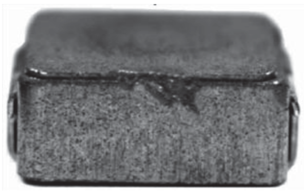
Surface irregularities

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

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.

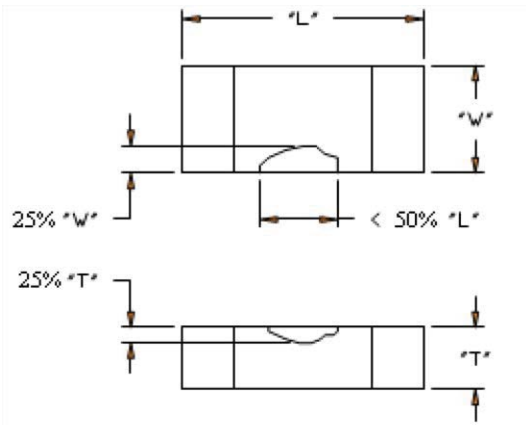
Major crack, rejectable

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.

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.

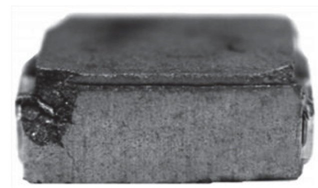


T	25 % of the thickness
W	25 % of the width
L	50 % of the length

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

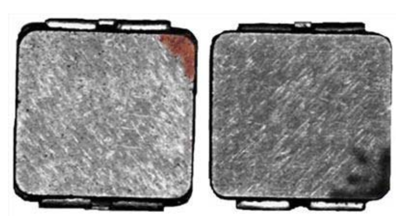
Major chips in the inductor body are those that are very obvious to the customer and may expose the wire coil or lead frame.

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

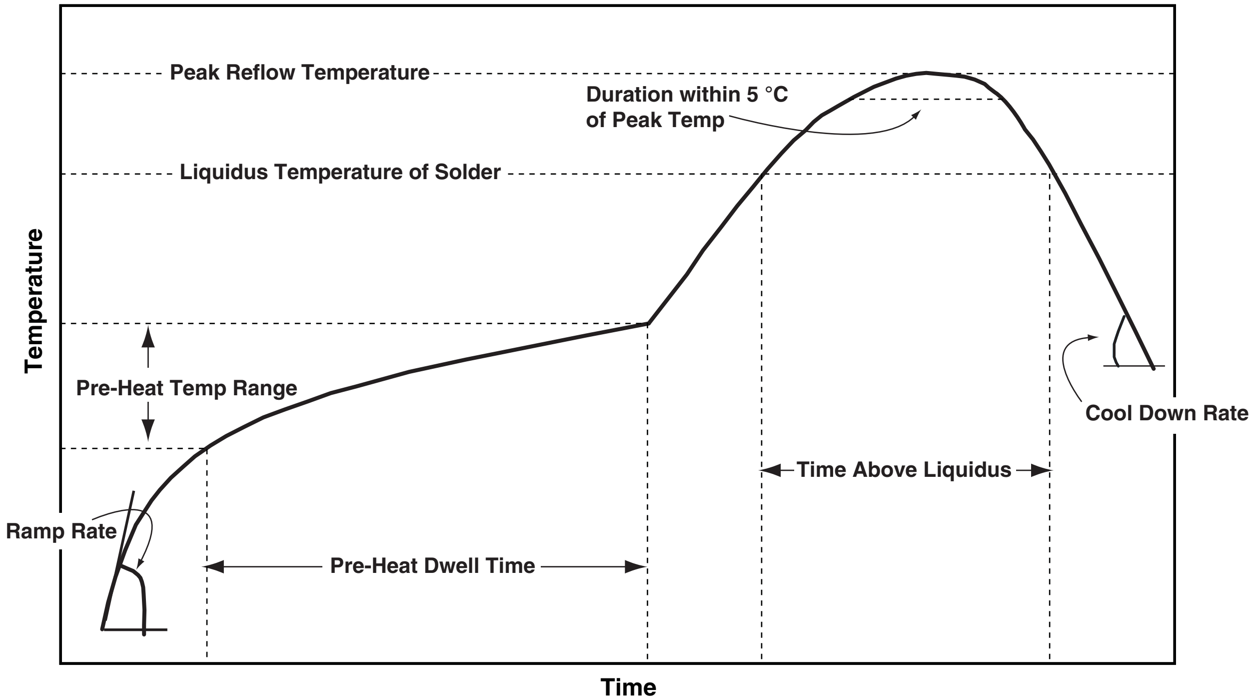


Fig. 1 - Infrared reflow soldering (SMD package)

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.